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SEISMIC & PUBLIC SAFETY ELEMENT

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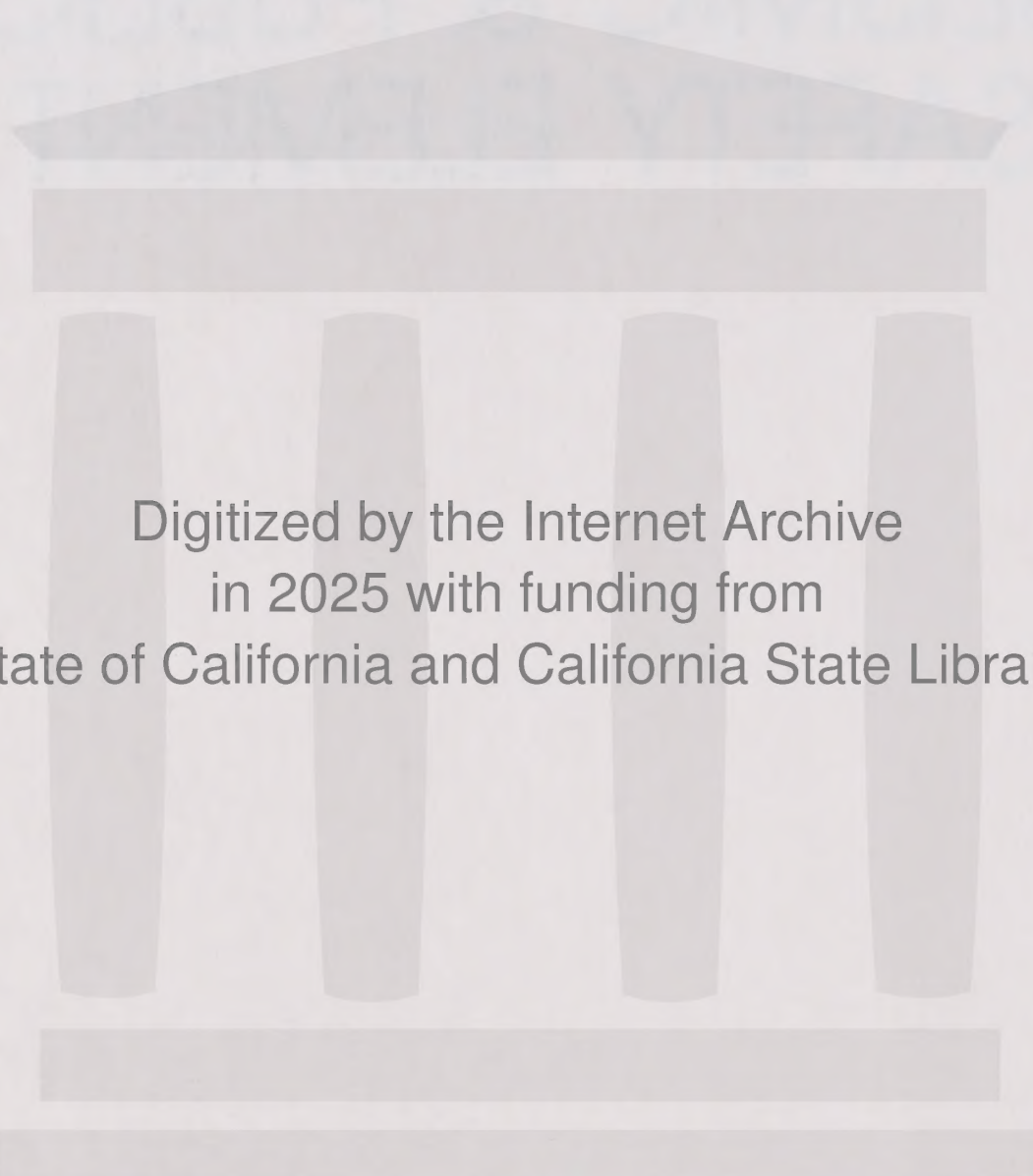
City of Chino

September 1974

SEISMIC & PUBLIC SAFETY ELEMENT

City of Chino

September 1974



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RESOLUTION NO. 74-86

A RESOLUTION OF THE CITY COUNCIL OF
THE CITY OF CHINO FOR THE ADOPTION
OF AMENDMENT NO. 15 TO THE GENERAL
PLAN FOR THE CITY OF CHINO (SEISMIC
AND SAFETY ELEMENTS)

WHEREAS, the City of Chino has been working with
the County of San Bernardino over the past several months
in the development of the seismic and safety elements; and

WHEREAS, on the 5th day of August, 1974, the
Planning Commission set a public hearing for August 19, 1974;
and

WHEREAS, on the 9th day of August, 1974, notice
of public hearing was published in the local newspaper; and

WHEREAS, on the 19th day of August, 1974, the
Planning Commission held a duly advertised hearing regarding
the proposed amendment to the General Plan; and

WHEREAS, following said public hearing, the Planning
Commission declared that the proposed amendment is in the
best interest of the public health, safety and general welfare
of the community, and recommended that the City Council adopt
the San Bernardino County Seismic and Safety Elements by
reference; and

WHEREAS, all the provisions of the State Government
Code related to the amendment to the General Plan have been
complied with; and

WHEREAS, on the 23rd day of August, 1974, a notice
of public hearing was published in the local newspaper; and

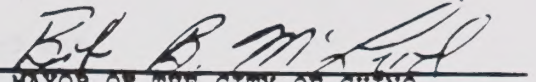
WHEREAS, on the 3rd day of September, 1974, the
City Council held a duly advertised hearing regarding the pro-
posed amendment to the General Plan; and

WHEREAS, following public hearing, the City Council
is in agreement with the recommendation of the Planning Commission;
and

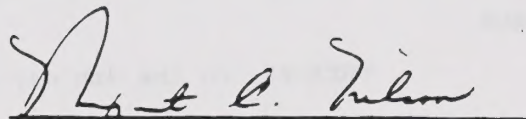
WHEREAS, all the provisions of the State Government
Code related to the amendment to the General Plan have been
complied with;

NOW, THEREFORE, BE IT RESOLVED that the City Council
of the City of Chino does hereby approve and adopt the above
Resolution No. 74-86 at its regular City Council meeting of
September 17, 1974.

APPROVED AND ADOPTED THIS 17TH DAY OF SEPTEMBER, 1974.


MAYOR OF THE CITY OF CHINO

ATTEST:


CITY CLERK OF THE CITY OF CHINO

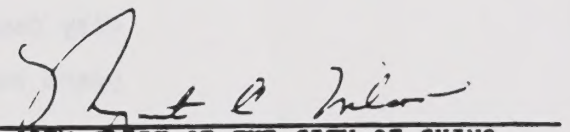
STATE OF CALIFORNIA)
COUNTY OF SAN BERNARDINO) ss.
CITY OF CHINO)

I, MARGARET C. WILSON, City Clerk of the City of
Chino, do hereby certify that the foregoing Resolution of
the City of Chino was duly adopted by said City Council at
a regular meeting held on the 17th day of September,
1974.

AYES: COUNCIL MEMBERS: FRKETICH, CARTER, LYNCH, MARTINEZ, MCLE

NOES: COUNCIL MEMBERS: NONE

ABSENT: COUNCIL MEMBERS: NONE


CITY CLERK OF THE CITY OF CHINO

Fellow Citizens:

In the past, the residents of San Bernardino have led a comfortable life, filled with little concern to natural hazards. While we have had little exposure with earthquakes and the other geologic hazards, flooding and wildland fires seem to be an annual problem. Also, as geological research continues, we are becoming aware that an earthquake of major proportions is not at all impossible in our County.

We all remember the disastrous 1971 San Fernando earthquake, the 1969 flood, and the devastating 1970 forest fires. As a result of these and similar past hazards, the County of San Bernardino recognizes the need to prepare a written policy document called the Seismic and Public Safety Element of the County-wide General Plan. The County's general goal is to protect you, the public, from death and injury resulting from geologic, flood and fire hazards. The County also wants to reduce the damage to your property and to reduce the hardships of rebuilding your home and business once these hazards occur.

This document is not intended to tell you where you may live or work; rather it is written to assist decision makers in understanding our County-wide geologic, flood and fire problems. It is also intended to be an educational tool. A good understanding of geologic, flood and fire hazards is step one in insuring an adequately safe, hazard-free, environment in which to live.

The Seismic and Public Safety Element is presented in the following three chapters: Chapter I, Background, introduces the problem, explains the purpose of the Element and its relationship to the public interest; discusses "acceptable risk", and defines the planning area; Chapter II, The Problems, summarizes the basic hazards; and finally, Chapter III, The Plan summarizes the major problems in the County, introduces the County's goals and objectives, and presents measures to achieve these goals and objectives.

By design, this Seismic and Public Safety Element will help in the reduction of geologic, flood and fire hazards, but, it will not eliminate them. The level at which this Element will effectively reduce a hazard can only be determined by you. You are the key, your support alone will insure the success of this program.



San Bernardino County Board of Supervisors

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Daniel D. Mikesell, Second District

James L. Mayfield
James L. Mayfield, First District

Dennis Hunsberger
Dennis Hunsberger, Chairman, Third District

Nancy E. Smith
Nancy E. Smith, Fifth District

Robert O. Townsend
Robert O. Townsend, Fourth District

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(March 4, 1975)**

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V.T.N. Engineering	Cty. Eng. & Planner
Robert Johns	City Manager

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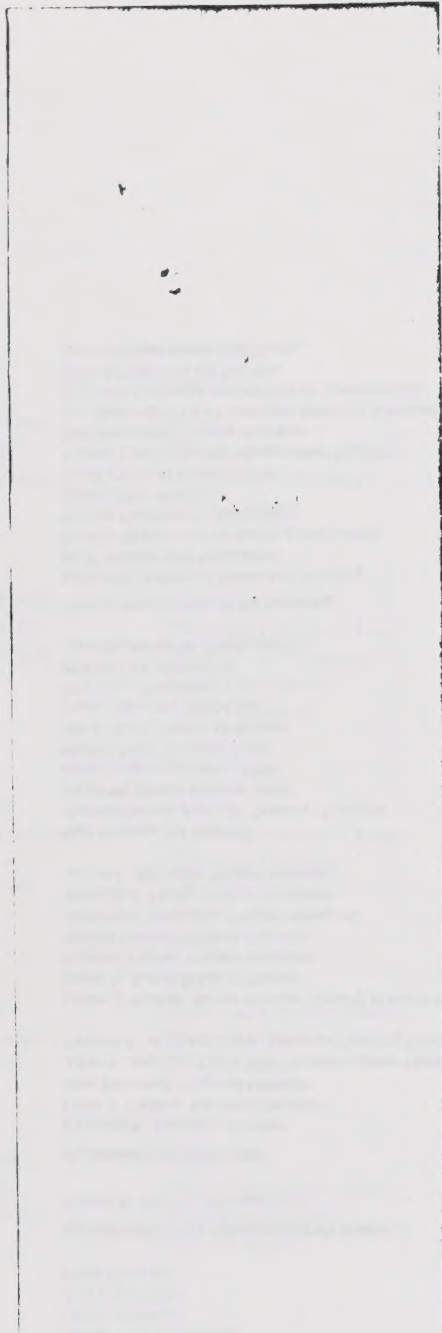
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W. A. Wahler and Associates
County Department of Building and Safety
County Fire Chief's Association
County Fire Warden
County Flood Control District
County Environmental Improvement Agency
San Bernardino County Museum
San Bernardino Fire Prevention Officer's Association
Southern California Association of Governments
United States Forest Service
United States Geological Survey

PROPERTY OF
CITY OF CHINO
PLANNING DEPARTMENT



ABOUT THE COVER: This picture portrays structural damage to the San Fernando Juvenile Hall as a result of the San Fernando earthquake of February 9, 1971.

This Element was prepared in compliance with Government Code Section 65302 (h), and adopted by the County Board of Supervisors on September 10, 1974.

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BACKGROUND

CHAPTER I

INTRODUCTION

PUBLIC INTEREST

DETERMINATION OF ACCEPTABLE RISK

PURPOSE OF ELEMENT

PLANNING AREA

A. SEISMIC HAZARDS

B. NON-SEISMIC GEOLOGIC HAZARDS

C. FLOOD HAZARDS

D. WILDLAND FIRES

E. INCIDENCE OF CRIME



First recording of a major earthquake on July 28, 1769
Gaspe de Portola Expedition

INTRODUCTION

Southern California has a long history of natural and man made or man-accentuated hazards such as earthquakes, landslides, erosion, flooding, and *wild-land fires*^{*}, terminating at times in natural disasters. The first recording of a major earthquake occurred in July 28, 1769, when a Spanish colonizing expedition, under Gaspar de Portola was rocked by a violent earthquake while encamped near the Santa Ana River in what is now San Bernardino County. Since this first recording, California has witnessed three truly great earthquakes, over 25 moderately strong earthquakes, and numerous smaller ones.

All of Southern California can still painfully remember the rubble of the San Fernando Earthquake, which occurred in February of 1971. This one quake was responsible for the deaths of 65 persons and over \$1 billion dollars worth of property damage.

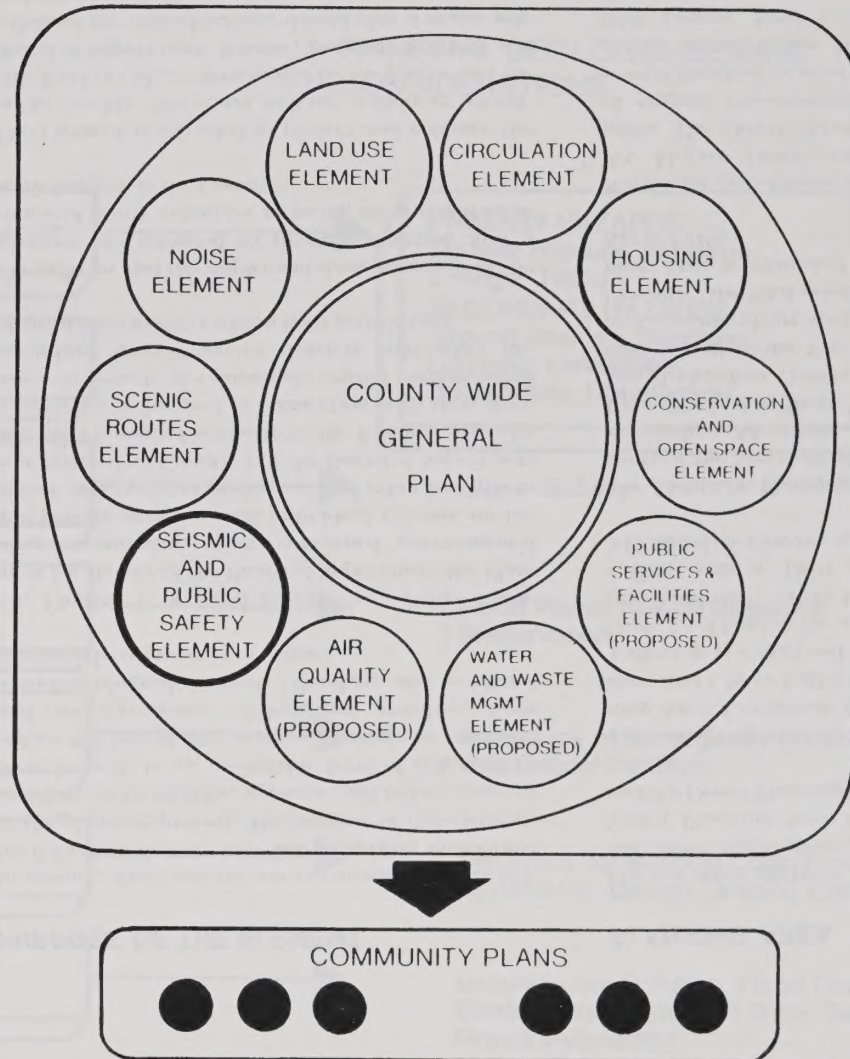
Although much has been accomplished in reducing the flood hazard, flooding remains a major disaster problem in California. The California Division of Mines and Geology has, in fact, estimated California flood losses to be more than \$6.5 billion dollars during the next thirty years.

Wildland fire is another common problem in both the State of California, and San Bernardino County. Along with the growing rate of rural development, the threat of wildland fire losses has increased greatly. In fact, during the disastrous year of 1970, 722 homes and 576,000 acres of valuable watershed were consumed by brush and forest fires in California during a 13-day period. In addition, 16 lives were lost, directly attributable to the fires.

Due to the infrequent occurrence of these hazards, developers and the public alike have often tended to ignore them, developing land that is located directly on earthquake faults, in flood plains, or in high fire risk areas.

^{*}*Italicized words in this report are defined in the Glossary of Terms.*

Figure 1 — Relationship of the Seismic and Public Safety Element to the San Bernardino County General Plan Program.



PUBLIC INTEREST

The Seismic and Public Safety Element relates to public interest in two ways. First, the public must, in the long term, be the judge of what is "acceptable risk". Public opinion, is, therefore, a basic input to policy decisions. Second, the preparation of this Element makes available necessary information for intelligent public opinion. In particular, this Element includes information concerning (1) seismic (pertaining to earthquakes), geologic and other safety hazards, (2) the general means available to reduce risk and damage, and (3) disaster preparedness plans.

DETERMINATION OF ACCEPTABLE RISK

Risk is defined as the probability of death, injury or damage occurring over some period of time. By identifying the risk associated with any existing or proposed development, and comparing it with the risk alternative plans and programs, planning decisions can be made to enhance the safety of the community.

A specified degree of acceptable risk is "a level of risk below which no specific action by local government is found to be necessary." Unacceptable risk, on the other hand is "that level of risk above which specific action by the appropriate authority is regarded as necessary to protect life, property, and social disruption." The level of acceptable risk is the balance between the cost and the benefit. The cost that we are willing to pay in work, time and money, to alleviate or reduce a hazard is related to the level of risk we are willing to accept.

PURPOSE OF THE ELEMENT

In essence, there are certain environmental and cultural hazards that we have not adequately considered in the planning process. The purpose of this element, therefore, is to identify, appraise and reduce some of these hazards to an acceptable level of risk, and to reduce the loss of life, injuries, damage to property, and social-economic dislocations resulting from seismic-geological hazards, flooding and wildland fires and the occurrence of crime.

The Element is designed to serve as a Policy Document for the use of the Board of Supervisors, the Planning Commission, other concerned governmental and private agencies, and individual citizens, on the nature and extent of geological and other hazards in San Bernardino County. For the Board of Supervisors and the Planning Commission, the Element provides a reference to be used in connection with their decisions on private development, capital improvement programs, special service districts, and other implementation matters within their jurisdiction.

The policies and the implementation programs of the Element are intended to provide direction and a course of future action for reducing natural and man-made hazards in the County.

The Element is intended to protect and enhance the public health, safety and welfare, within an acceptable level of risk, as determined by the public and the Board of Supervisors. *Seismic*, geologic, flooding and *wildland fire* considerations should play a major role in determining future land use.

PLANNING AREA

For our study purposes, the County has been divided into three major geographic regions comprising the Valley Planning Area, the Mountain Planning Area, and the Desert Planning Area.

The major emphasis of the Element is the Valley Planning Area. Commonly referred to as the San Bernardino and Chino Valleys (or Upper Santa Ana River Valley) it is comprised of 450 square miles of relatively level land in the southwest portion of the County. Almost 80% of the County's residents live in this valley, with a 1970 population estimated to be 545,483 (U.S. Census, April, 1970).

The Mountain Planning Area consists of the easterly spurs of the San Gabriel and the majority of the San Bernardino Mountain range, which separate the Upper Santa Ana River Valley from the desert area of San Bernardino County. Most of the mountain terrain is within the San Bernardino National Forest and consists of an area in excess of 600,000 acres. Presently, the total population of the Mountain Planning Area is estimated to be 20,374 (U.S. Census, April, 1970).

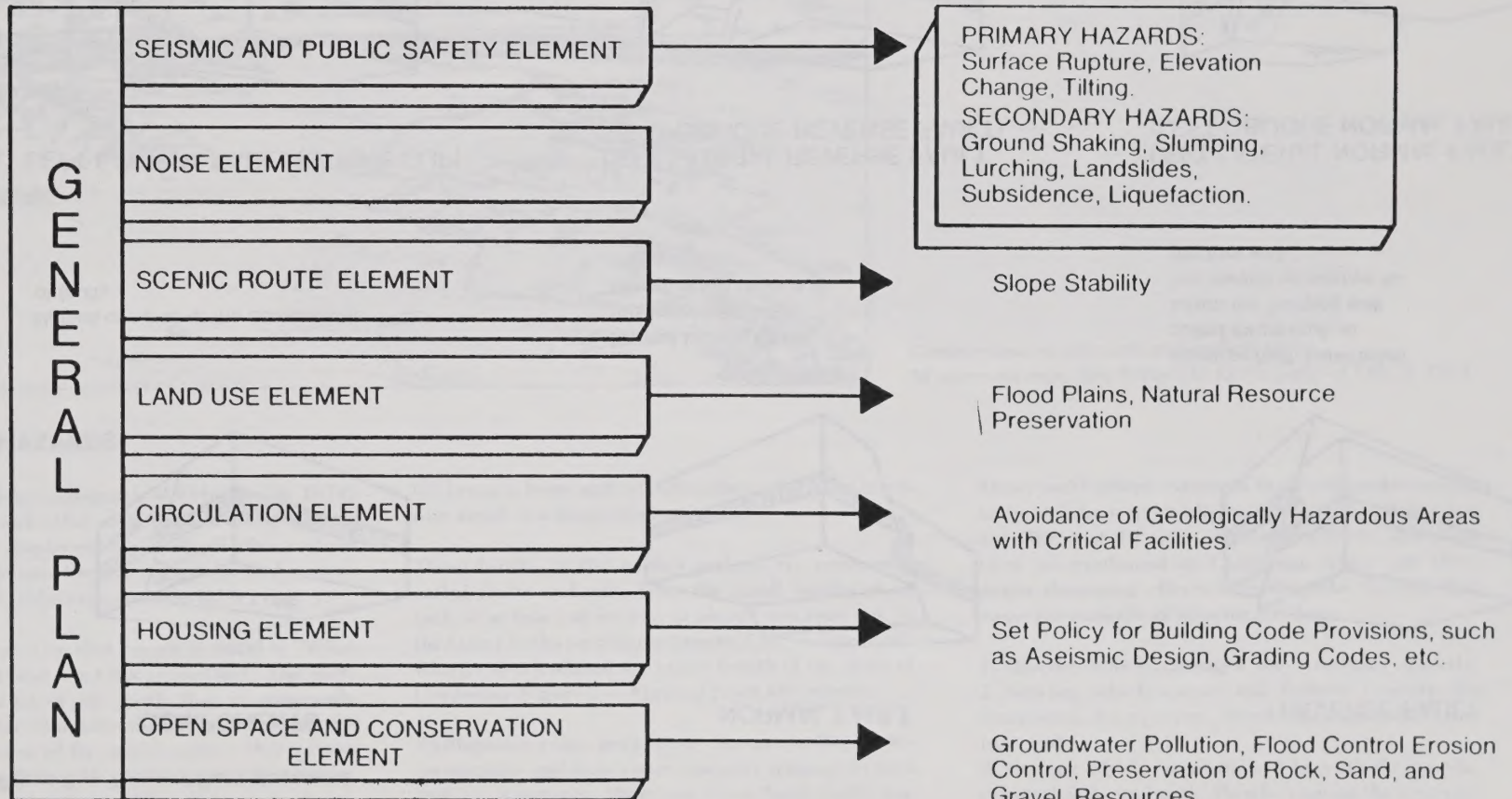
North and east of these mountain ranges lies the vast, dry Mojave Desert, encompassing 19,000 square miles. The Desert Planning Area consists primarily of rugged, disconnected mountain ranges elevated several hundred to several thousand feet above intervening broad basins. It is estimated that 116,376 (U.S. Census, April 1, 1970) persons reside in the desert planning area.

Figure 2

GEOLOGIC FACTORS IN GENERAL PLANS (TYPICAL)

PRINCIPAL GEOLOGIC/SEISMIC CONSIDERATIONS

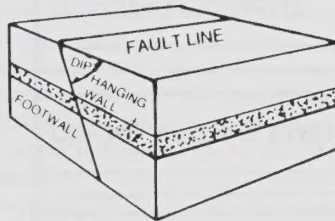
ELEMENTS



NOTE: General plan elements based on section 65302 of the California Government Code.

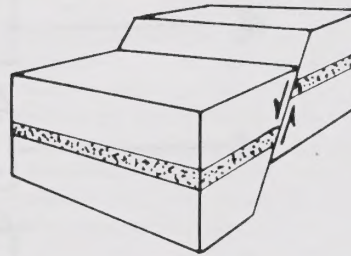
Figure 3 — Types of Fault Movement

COMPONENTS



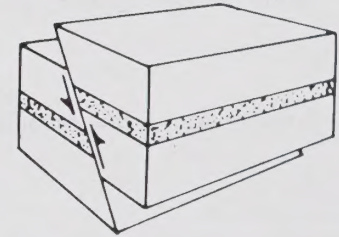
Names of some of the components of faults.

NORMAL FAULT



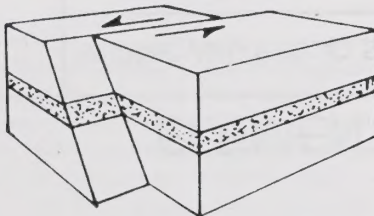
Normal fault, in which the hanging wall has moved down relative to the foot wall.

REVERSE FAULT



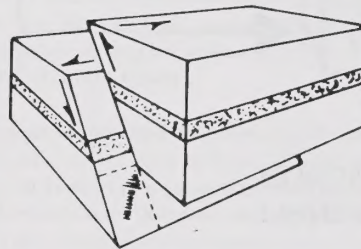
Reverse fault, sometimes called thrust fault, in which the hanging wall has moved up relative to the foot wall.

LEFT LATERAL FAULT (STRIKE-SLIP)



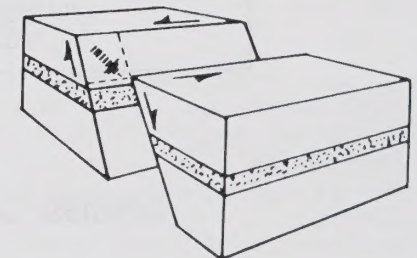
Lateral fault, sometimes called strike-slip fault, in which the rocks on either side of the fault have moved sideways past each other. It is called **left** lateral if the rocks on the other side of the fault have moved to the left, as observed while facing the faults, and **right** lateral if the rocks on the other side of the fault have moved to the right, as observed while facing the fault.

LEFT LATERAL REVERSE FAULT (LEFT OBLIQUE REVERSE FAULT)



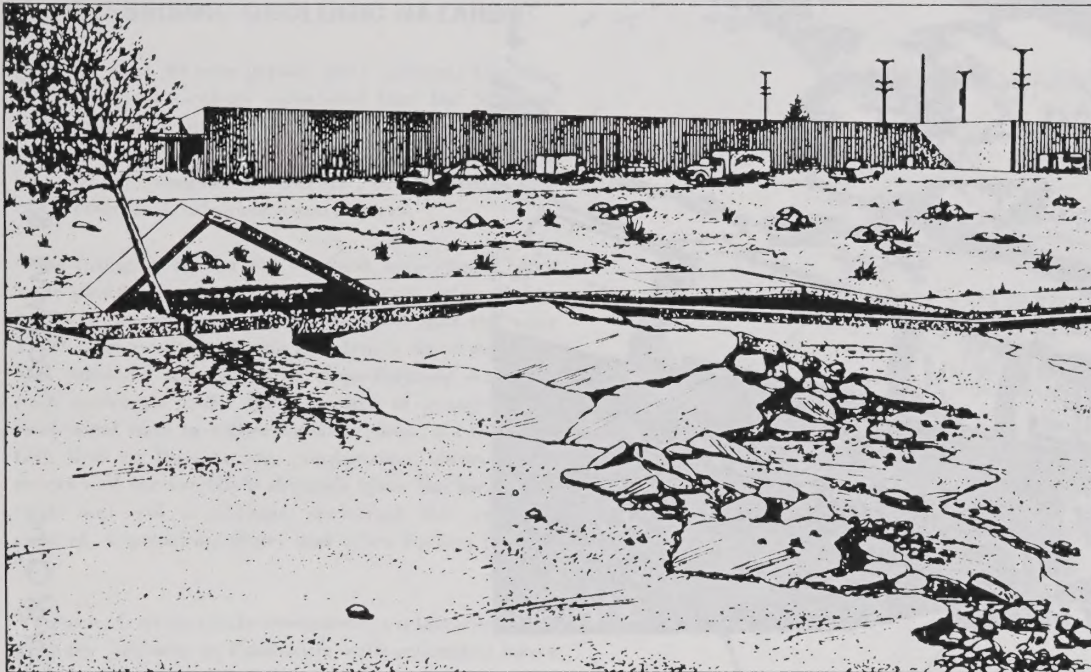
Left lateral reverse fault sometimes called a left oblique reverse fault. Movement of this type is a combination of left lateral faulting and reverse faulting.

LEFT LATERAL NORMAL FAULT (LEFT OBLIQUE NORMAL FAULT)



Left lateral normal fault, sometimes called a left oblique normal fault. Movement of this type of fault is a combination of normal faulting and left lateral faulting.

Source: California Geology, Nov. 1971



*Compression of sidewalk and asphalt street.
Montero Avenue, San Fernando Earthquake of Feb. 9, 1971.*

A. SEISMIC HAZARDS

The San Fernando earthquake of February 9, 1971, was a vivid reminder that earthquakes and the violent distortions and displacements of the earth's surface that often accompany them are a natural and permanent part of the California environment.

The very first question that comes to mind is "What is an earthquake and what is it caused by?" The shaking and trembling of the earth that is commonly referred to as an earthquake, is the result of an abrupt break or movement of the earth's surface that follows a release of energy in the earth's crust. This energy release can be caused by a sudden dislocation of portions of the earth's crust due to a volcanic eruption, or even a man-made explosion. If the area of the quake is small and limited to the deeper part of the crust, the resulting earthquake will be small. However, if

the break is large and extends to the surface, the break may result in a disastrous earthquake.

These breaks in the earth's surface are commonly called *faults* and vary from the small breaks of an inch or so that can be seen in almost any road cut, to the larger faults such as the famous San Andreas Fault which extends almost the entire length of the State of California (Figure 3 — Types of Fault Movement).

Earthquakes cause permanent changes in the earth's topography and may cause extensive damage to man and his structures. There are three basic earth material-failure mechanisms associated with an earthquake: shaking, breaking and water damage. SHAKING is the primary cause of building collapse during an earthquake. The California Division of

Mines and Geology estimates that earthquake shaking alone will be responsible for a \$21 billion dollar loss over the next 30 years if present policies and practices are continued in California. There are three major damaging effects of earthquake shaking that cause the majority of structural failure:

1. Shaking which damages the structures directly.
2. Shaking which causes soil failures beneath the foundation of a structure, thereby damaging the structure, and
3. Shaking which causes the soil beneath the foundation to densify and settle, thereby causing the structure to be damaged.

The most common mechanism describing this last effect is "liquefaction", a quicksand-like condition. This condition occurs when the shaking action of the earthquake causes water saturated cohesionless soils (such as silt, sand, or gravel) to lose all strength, resulting in extensive damage to structures due to the settling, tilting or sliding of the foundation.

BREAKING of the earth's surface can commonly be caused by three different processes: (1) FAULT RUPTURE, or the displacement of two portions of the earth along an earthquake fault, resulting in

devastating effects on structures that cross the line of displacement; (2) LURCHING or the cracking and rupturing of soils at places other than directly along faults, caused by the inability of long masses of unconsolidated soils to support shaking accelerations; and (3) SLOPE FAILURE of unstable soils touched off by earthquake shaking which occasionally induces destructive landslides.

WATER DAMAGE: In San Bernardino County, this can result from either "seiches" or dam failure. A seiche is a wave action resulting from the shaking of a body of water such as a lake or a reservoir, causing

possible damage to peripheral lakeside development

Dam failure during an earthquake may have devastating effects in some areas of California. The Van Norman Dam, for example, almost ruptured during the 1971 San Fernando Earthquake, threatening the lives of 80,000 people. With the exception of Lake Arrowhead, the hazard of dam failure appears to be minimal with most dam sites being located in areas of minimal development or low seismic risk.



B. NON-SEISMIC GEOLOGIC HAZARDS

Over the next 30 year period, the California Division of Mines and Geology estimated that the State of California will suffer over a \$10 billion dollar loss in non-seismic geologic hazards (Figure 4). These hazards are comprised, basically, of landslides, volcanic eruptions, subsidence and erosion.

Landsliding is by far the costliest non-seismic, geologic problem, with losses in California estimated to be \$9.9 billion dollars between 1970 and the year 2000. This costly, geologic problem is the downward and outward movement of slope-forming earth or rock materials under the influence of gravity. This movement may be either rapid or slow; it can either fall, slide or flow or any combination thereof. The severity of the landslide depends upon the local bed-rock and soil conditions, including the moisture content, vegetation, slope, and other factors (Figure 5).

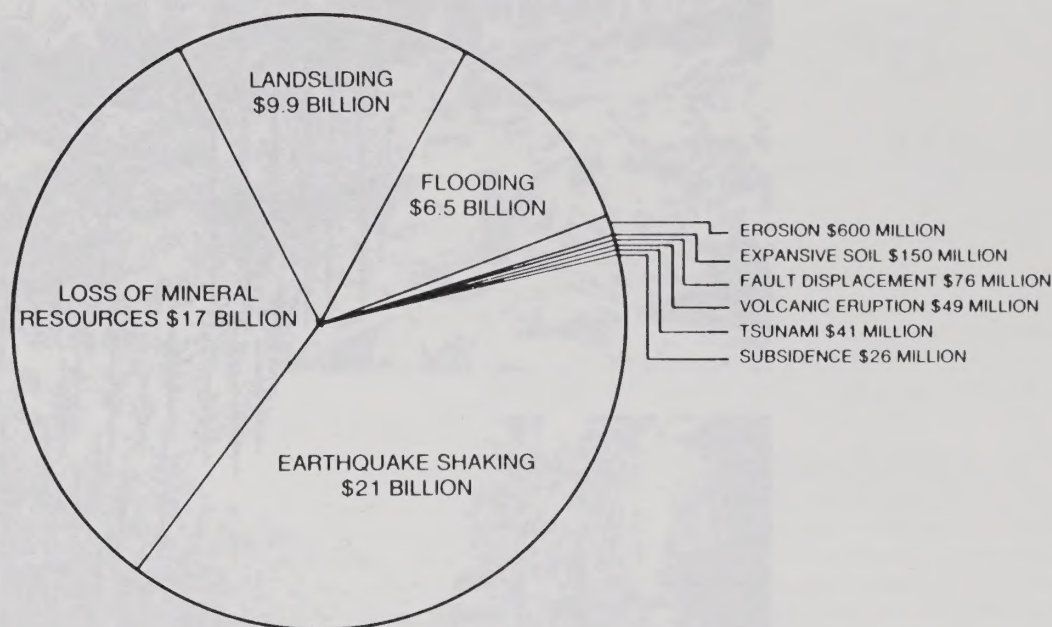
Volcanic Activity can be considered a relatively minor geologic problem in California with estimated losses of approximately 50 million dollars over the next thirty years. Damage is most likely to occur in the vicinity of Mt. Lassen and Mt. Shasta in northern California, and is considered extremely slight in San Bernardino County due to the remoteness of the County's volcanic areas to populated areas.

Subsidence - is generally defined as a lowering of the ground level, causing possible structural damage to buildings, water pipes, storm drains, irrigation ditches, and certain underground utilities. In San Bernardino County, the relatively small losses due to subsidence are caused by: extensive ground water withdrawal in the San Bernardino, Chino and Yucaipa Valleys, and *hydrocompaction* in certain desert areas where man first applies large amounts of water for irrigation purposes.

Erosion is a process by which earth or rock materials are loosened or dissolved and moved from place to

Figure 4

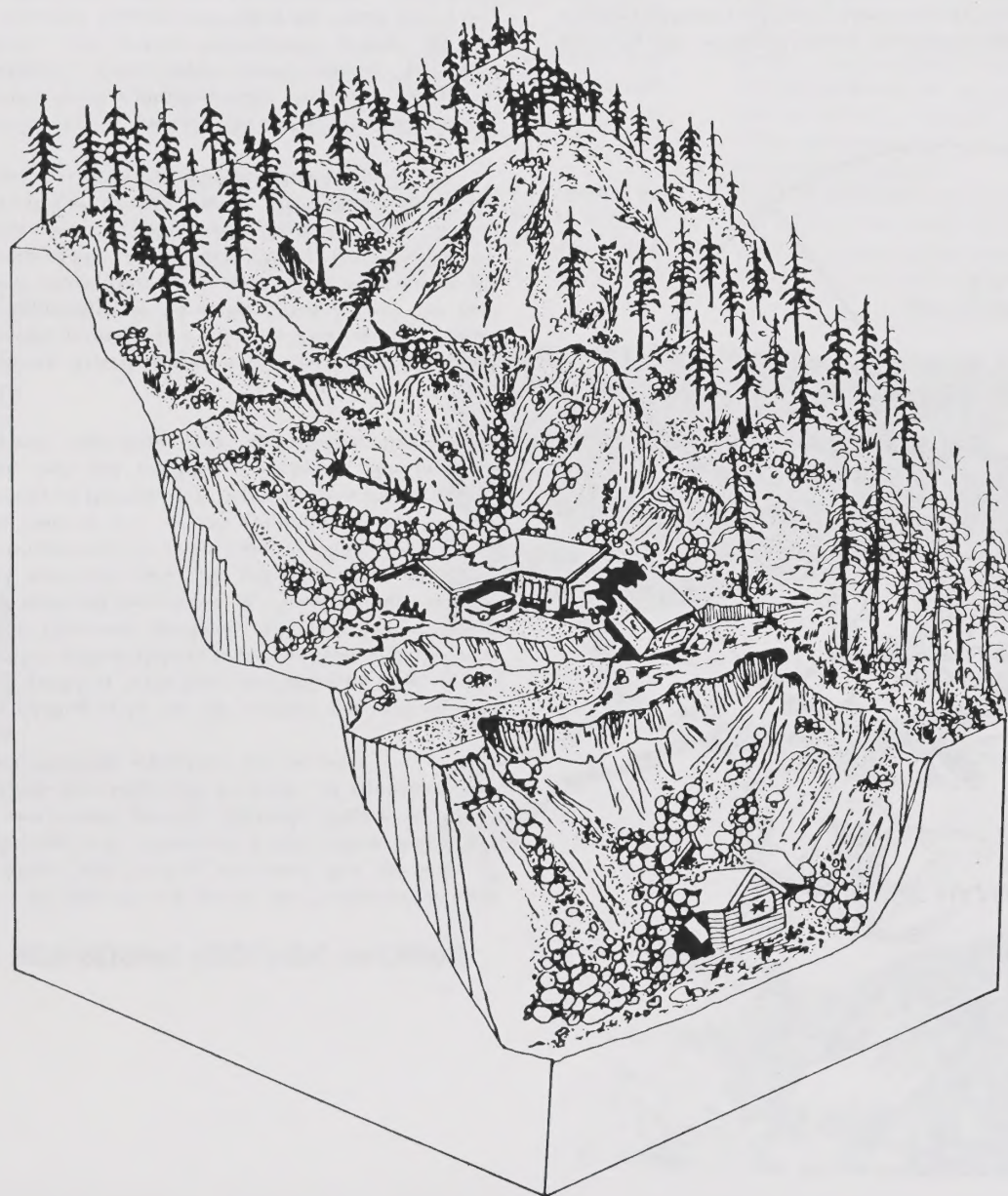
GEOLOGIC HAZARDS IN CALIFORNIA TO THE YEAR 2000: A \$55 BILLION PROBLEM



place by the action of water or wind. It generally creates two basic problems (1) the removal of material from one site and (2) its deposition at another site. This removal of material by stream, rainfall, or wind erosion has, at times, damaged many roads and structures in the County. The subsequent deposition of the removed materials may cause additional problems resulting in the silting up and damaging of rivers, reservoirs, drainage facilities and development located on or adjacent to the floodplains.

In developed areas, the problems of erosion can be effectively controlled with proper maintenance. On the other hand, erosion activity is difficult to control in rural, hilly or mountainous areas where the degree of erosion is dependent on the degree of steepness of the slopes, the amount and intensity of rainfall or wind, the nature of earth materials and the amount of protective ground cover or vegetation.

Figure 5



Where development has occurred on an unstable slope, the result can be a disastrous landslide as illustrated above.

C. FLOOD HAZARDS

Hazardous flooding has invariably become more severe as urban development replaces open land. In undeveloped areas, natural processes protect the land from excessive rainfall. Restrained by vegetation, much of the water from a heavy storm filters into the ground or is stored in holding areas such as lakes or reservoirs. However, with urban development such as streets, paving and buildings, covers the land, most of the rainfall is unable to filter into the ground. Becoming run-off it tends to add to the flood volume downstream. This problem is further magnified by the filling and development of flood plains and water settling areas, thereby impeding the floodwater flow and eliminating valuable water storage areas. Uncontrolled urbanization, in essence, aggravates the problem of flooding, hinders the passage of storm water, eliminates excess water storage areas, and leads to increased property damage.

Although the San Bernardino County Flood Control District and other state and federal agencies have accomplished much in reducing the flood hazard, flooding remains a problem in certain areas of San Bernardino County for several reasons. First, local floods are usually unpredictable, often occurring after a period of dry spells which lulls people into a false sense of security. Secondly, floods are usually intense when they do occur, such as the 1969 flood which rapidly created serious flood conditions. Third, people still tend to ignore the natural processes which protect against flooding, as demonstrated by unwise building, grading, and filling which continues to take place on land that should be left in open space.



D. WILDLAND FIRES

Although the possibility of earthquake-caused fire must ever be considered, the most chronic and probable threat for a large disastrous fire is posed by a wildland fire (brush or forest fire). Although occurring in more remote areas, a wildland fire is capable of burning thousands of acres and threatening the lives and properties of hundreds. During the years 1960 through 1969, 2,036 structures were lost as a direct result of wildland fires in California. You may still remember the disastrous Meyers fire of 1970 which blackened the skies of southwestern San Bernardino County, consuming 34,000 acres of land, 10 homes and claimed the life of one person. There are few indications that these losses will be left unchallenged. Each year finds more homes and subdivision developments constructed in the mountains and surrounding foothills, in disregard or ignorance of probable damages from wildfires. This condition provides an increasingly greater potential for future wildland fire disaster.

Any wildfire, regardless of size or location, poses a threat to life and property until it is contained or controlled. Therefore, it must be recognized that all of San Bernardino and San Gabriel Mountains and the surrounding foothills are "hazardous" and that fire prevention and safety measures must be used wherever people and their improvements are in contact with these wildlands. There are, however, varying degrees of hazards based primarily on the weather, the topography, degree of slope, and the amount and type of vegetation. These varying degrees of hazards in turn require varying degrees of fire prevention that must be practiced by resident and visitors alike.

E. INCIDENCE OF CRIME

The incidence of crime in both urban and rural areas has been rising at an alarming rate over the past several years. The majority of these offenses are violent crimes against persons, such as murder, forcible rape, robbery, and assault. In San Bernardino County these crimes increased alarmingly during 1973:

murder -- up 114%, rape -- up 55%, robbery -- up 12%, aggravated assault -- up 2½%, and burglary -- up 12%.* Along with the rising crime rates has been an accompanying rise in the fear for personal safety.

One positive way to make our environment secure and safe is to consider crime prevention measures in site planning and structural design. Historically, planners and developers have not adequately considered crime prevention measures in the physical design of their proposed developments, thereby decreasing security and safety and increasing the opportunities for the occurrence of crime.

This neglect of crime prevention measured in the physical design of developments can be explained by (1) the lack of an organized body of crime preventive measures, (2) lack of techniques and experience in applying this knowledge to specific designs; and (3) the lack of recognition by developers and planners on the importance of considering crime prevention measures in their physical design and development.

*Sun-Telegram, March 28, 1974, pg B-1



THE PLAN

CHAPTER II

- A. "SEISMIC AND GEOLOGIC HAZARDS POLICY PLAN"
- B. "FLOOD HAZARD POLICY PLAN"
- C. "WILDLAND FIRE HAZARD POLICY PLAN"
- D. "DEFENSIBLE SPACE POLICY PLAN"
- E. SAN BERNARDINO COUNTY'S EMERGENCY PREPAREDNESS PROGRAM



The Plan considers the policies of the four separate but related problems, Seismic and Geological Hazards, Flooding Hazards, Wildland Fire Hazards, and Defensible Space. The framework of each Policy Plan consists of:

1. General Goal – long-range purpose.
2. Specific Objectives – broad work tasks.
3. Policies – detailed definition of responsibilities and causes of action.
4. Plan Implementation – actions addressed by this plan.

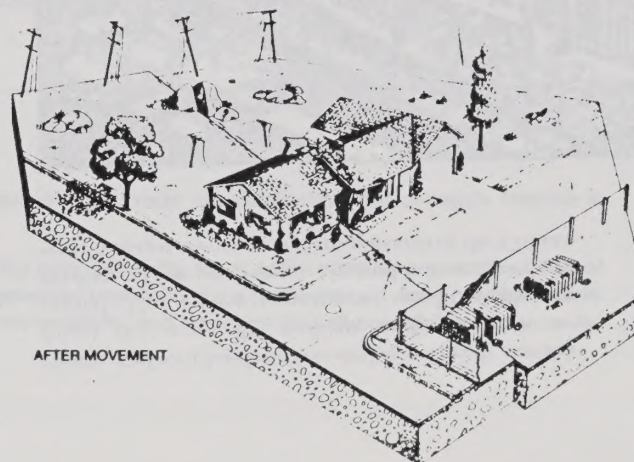
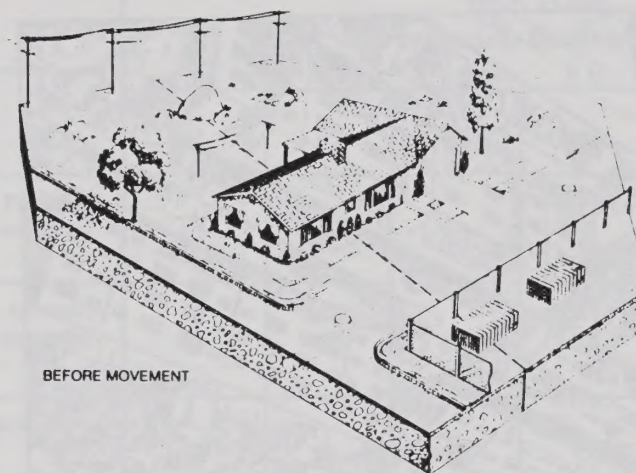
Structural failure due to ground shaking earthquake, Anchorage, Alaska.

A. SEISMIC AND GEOLOGICAL HAZARDS POLICY PLAN

The primary seismic and associated geologic hazards in San Bernardino County are: fault rupture, earthquake shaking, ground failure, landsliding, volcanic activity, subsidence and erosion.

Ground ruptures due to earthquake faulting is a significant hazard in many portions of San Bernardino County. Based upon studies completed, more than 30 active faults have been identified within the County. The largest and most major faults are shown on Map 2 and Map 3, the Seismic and Geologic Hazards Management Zone Maps for the Valley Planning Area, and the Mountain-Desert Planning Area respectively.

In general terms, damage due to ground surface rupture is insignificant when compared to damage sustained from earthquake shaking. However, primary surface rupture may have a devastating effect on structures that cross the line of displacement. For this reason, construction of structures of human occupancy across lines of potential rupture should be avoided whenever possible. Progress in this direction has been achieved by the recently enacted Alquist-Priolo Geologic Hazard Zones Act which provides for comprehensive geological studies along identified fault zones and requires the delineation of potentially active fault traces. The major purpose of the act is to prohibit construction of buildings for human occupancy across active traces of a known fault. Structures can be built directly next to an active fault although for safety, a conservative setback of at least 50 feet is required. The faults presently covered under the Act are shown on Map 6, Generalized Areas Covered by the Alquist-Priolo Special Studies Zones.

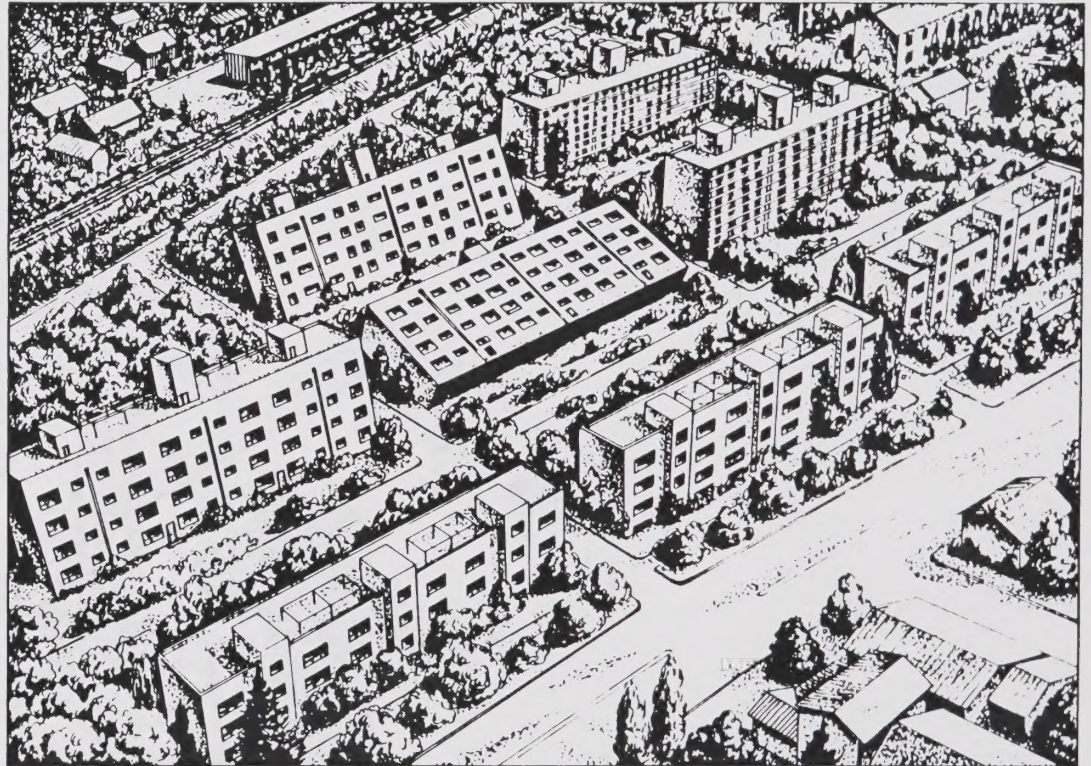


The identification of these hazardous fault zones is extremely important for the Valley Planning Area where 80% of the County's residents reside. This area is traversed by three major, historically active faults, capable of fostering huge, destructive earthquakes: The famous San Andreas fault, characterized by large infrequent earthquakes; the San Jacinto fault, considered by geologists to be the most active fault in California; and the Cucamonga fault, which is also considered to have a high potential for generating significant earthquakes.

Damages to structures due to fault displacement in the Desert Planning Area must be considered as slight, since there are no known active faults that traverse desert communities. However, there are a large number of earthquake faults that may prove to be potentially hazardous in the future development of the desert. Special hazard studies identifying the hazard zones should, therefore, be conducted on the major active faults in the desert: the Pinto Mountain fault, located near Twenty-nine Palms; the active Manix fault in the east-central Mojave Desert; the Garlock fault which is the second largest fault in California; and six large, northwest trending faults, the Helendale, Lockhart-Lenwood, Harper-Camp Rock-Emerson, Calico-Mesquite, Pisgah and Ludlow faults.

The entire San Bernardino — Chino Valley may be subjected to shaking levels varying in degree from strong to very strong, capable of having disastrous effects on many structures in the Valley. The reason for this high degree of shaking potential is primarily due to the Valley's composition of loose, unconsolidated, alluvial fill (gravel, sand, silt, and clay). The major variables in the degree of Valley shaking are dependent on the thickness of alluvium, the relation of the various beds in the alluvium, the depth of the water table, and the magnitude or size of the earthquake. These variables and their incurred shaking levels are shown on Maps 1, and 2, Seismic and Geologic Hazards Management Zone Maps. The maps indicate hazard zones, which in turn are correlated to land use on the Seismic Risk — Related Land Use

charts. Unless a land use is coded as generally suitable (black dot) a specific geologic study should be required. This review requirement would supplement existing review procedures. Ground failure also represents a major threat in certain portions of the County.



Example of tilting and sinking of earthquake resistive structures built on unconsolidated water saturated sand and mud (liquefaction), Kawagishicho, Niigata, Japan 1964.

SEISMIC RISK-RELATED LAND USES FOR DESERT PLANNING AREA

BUILDING TYPE/LAND USES		RISK ZONE — Increasing Relative Risk →					
↑ GENERALLY INCREASING "ACCEPTABLE RISK" ↓	GROUP:	I A	I B	II A	II B	III A	III B
	I Nuclear Facilities, Large Dams, Electrical Power Systems.	O	O	O	O	X	X
	II Schools, Hospitals, Fire Police, Emergency Communication Facilities, Critical Transportation Elements such as Bridges, Overpasses, Smaller Dams, Important Utility Centers.	O ₁	O	O	O	O	O
	III Churches, Large or Highrise Buildings, or Other Places Normally Attracting Large Concentrations of People, such as Civic Buildings, Large Commercial Structures, Most Roads, Other Utilities.	●	●	O	O	O	O
	IV Residential (Single-Family Residences, Apartments, etc.) Most Commercial and Minor Public Structures.	●	●	●	O	O	O
	V Most Industrial, Other Minor Commercial (Warehouses).	●	●	●	●	O	O
	VI Agriculture, Marinas, Managed Mineral Resources Development, Parks, Other Open Space, Refuse Disposal Sites.	●	●	●	●	●	●

FOOTNOTES:

1. Development may be feasible in slide areas if adequate provisions are made for stabilization, not generally feasible in potentially active fault zones.

GENERAL NOTES: This chart is for general land use planning only. Suitability for specific uses for a specific site must be confirmed by further investigation. An area evaluated as generally unsuitable for a particular use does not necessarily preclude the use, if no other more suitable alternative sites are available, and, provided that all potential hazards can be mitigated.

SYMBOLS:

- Generally Suitable
- O Provisionally Suitable
- X Generally Unsuitable

SEISMIC RISK-RELATED LAND USES FOR VALLEY AND MOUNTAIN PLANNING AREAS

BUILDING TYPE/LAND USES		RISK ZONE — Increasing Relative Risk →				
↑ — GENERALLY INCREASING "ACCEPTABLE RISK." —	GROUP:	II A	III	IV	V	VI
	I Nuclear Facilities, Large Dams, Electrical Power Systems.	O	O	X	X	X
	II Schools, Hospitals, Fire Police, Emergency Communication Facilities, Critical Transportation Elements such as Bridges, Overpasses, Smaller Dams, Important Utility Centers.	O	O	O	O	O
	III Churches, Large or Highrise Buildings, or Other Places Normally Attracting Large Concentrations of People, such as Civic Buildings, Large Commercial Structures, Most Roads, Other Utilities.	O ₁	O	O	O	O
	IV Residential (Single-Family Residences, Apartments, etc.) Most Commercial and Minor Public Structures.	●	O ₁	O	O	O
	V Most Industrial, Other Minor Commercial (Warehouses).	●	●	O ₁	O	O
	VI Agriculture, Marinas, Managed Mineral Resources Development, Parks, Other Open Space, Refuse Disposal Sites.	●	●	●	●	●
FOOTNOTES: 1. Development may be feasible in slide areas if adequate provisions are made for stabilization, not generally feasible in potentially active fault zones. GENERAL NOTES: This chart is for general land use planning only. Suitability for specific uses for a specific site must be confirmed by further investigation. An area evaluated as generally unsuitable for a particular use does not necessarily preclude the use, if no other more suitable alternative sites are available, and, provided that all potential hazards can be mitigated. SYMBOLS: ● Generally Suitable O Provisionally Suitable X Generally Unsuitable						

The most common mechanism for ground failure is liquefaction. This process occurs when the shaking action of an earthquake causes water-saturated, loose, granular materials, such as silt, sand or gravel, to lose all strength resulting in extreme damages to structures due to the settling, tilting or floating of the foundation.

Areas in San Bernardino County most susceptible to liquefaction correspond to the areas of marsh land and high ground water which existed before extensive groundwater pumping lowered the ground-water levels (Figure 5). As shown on the aforementioned maps, there are two major areas of relatively high liquefaction potential in the San Bernardino-Chino Valley: the south central area of the City of San Bernardino and several adjoining communities, an area on the order of 30 square miles; and a 20 square mile area in the southwest corner of the Valley in the vicinity of Prado Dam.

The potential for earthquake generated seiche exists in San Bernardino County, where development has encroached to the edges of enclosed bodies of water, such as on Lake Parker, Big Bear Lake, and Lake Arrowhead. However, seiche hazards are difficult to predict since the height of the waves depend upon many variables, such as the water depth, underlying topography, and the distance from and magnitude (size) of the earthquake. More detailed studies should therefore be made on the aforementioned lakes, and seiche zoning should be considered if studies indicate a definable hazard.

The predominant non-seismic, geologic hazards in San Bernardino County are landslides, mudslides, volcanic activity, subsidence and erosion.

Most of the damage from landsliding will continue to occur in the urbanizing hillsides of the San Bernardino-Chino Valley, and the surrounding mountain range. The amount of property damage, and the accompanying loss of life is not expected to be great with the single exception of the alpine mudflow located above

the community of Wrightwood in the San Gabriel Mountains. Due to the high potential for extreme property damage and loss of life, detailed studies should be immediately implemented to establish zoning limits for further construction. For all Zone III and Zone IV areas shown on Maps 3 & 4, the Generalized Slope Stability Maps, further detail is required to establish sensible land use zoning limits. Priority for the detailed studies should be in the following order: Wrightwood Mud-flow area; Chino Hills; Zone IV in the San Gabriel and San Bernardino Mountains, and Zones III in the San Bernardino and San Gabriel Mountains.

Although potential volcanic activities exist in San Bernardino County, they should not cause undue anxiety as they are widely removed from inhabited areas. In addition, the Pisgah and Amboy cinder cones, as well as a large number located east of Baker, are generally considered dormant, though not necessarily extinct. Since many volcanic areas are under the control of the Bureau of Land Management, land-use plans should consider the retention of some of these lands for recreation, open space, wildlife and natural phenomena reserves and preserves.

Subsidence in San Bernardino County is most probably caused by ground-water withdrawal and hydro-compaction. The entire alluvial valley in the southwestern San Bernardino County (the Laverne, Chino-Riverside, and Bunker Hill-Yucaipa area) is experiencing ground subsidence from groundwater withdrawal. This minor problem may be reduced by the San Bernardino Valley Municipal Water Districts recent groundwater recharge program. However, there is little information available to determine the extent of subsidence due to hydrocompaction. Hydrocompaction subsidence usually remains undetected until new lands are brought under irrigation, resulting in damages to ditches, roads, pipelines and buildings.

Erosion control in the urban portion of the Valley

Planning Area, especially at the base of the mountain ranges, is a very important consideration of the individual homeowner. The erosion control aspects of land use planning can be encouraged through public education programs. Erosion prevention measures are generally included in grading plans and include recommended slopes, drainage provisions, and slope protection.

On a larger scale, the U.S. Forest Service and the U.S. Soil Conservation Service has done much in the way of reducing erosion in both the San Gabriel and San Bernardino Mountains. In an effort to control eroded material, the San Bernardino County Flood Control District has the responsibility for the construction and maintenance of debris or catch basins at the base of the mountains.

Wind blown sand¹ is the most important form of erosion in the Desert Planning Area. However, the identification of this form of erosion was beyond the scope of this Element.

See

"Sand Blow Study in the Barstow-Mojave River Area", Mojave Water Agency, et. al., U.S.D.A., Portland, October, 1973.

GENERAL GOAL

To reduce loss of life, injuries, damage to property and social-economic dislocations resulting from seismic-geologic hazards.



SPECIFIC OBJECTIVES

1. To interpret the geologic conditions within San Bernardino County.
2. To provide the regional information necessary to begin the process of developing land use plans which will protect against potential geologic dangers.
3. To propose procedures which will provide a degree of safety from structure failure.
4. To promote public awareness of geological hazards.
5. To provide guidance during and after a geologic disaster.
6. To promote interagency assistance for persons affected by geologic hazards.
7. To recognize and consider state-of-the-art advancements relating to geologic hazards.

POLICIES

1. Identify geologic conditions, in particular seismic conditions within the County needing special management (Goal 1).
2. Promote open space land uses on land determined unfit for structures of human occupancy. (Goal 2).
3. Develop public works projects designed to protect the public and property from geologic hazards. (Goal 2).
4. Request geologic studies for proposed development for human occupancy, emphasizing all critical facilities and structures of high or involuntary occupancy, within areas needing special management. (Goal 3).
5. Discourage the locating of structures for human occupancy on potentially active faults or on certain potential landslides and the path of their earth flow. (Goal 3).
6. Discourage the locating of critical facilities and structures of high or involuntary occupancy adjacent to a potentially active fault. (Goal 3).
7. Stress compatibility between structural design and the local geologic hazard. (Goal 3).

8. Support programs which would locate seismically-unsafe structures and elements, and then require their mitigation. (Goal 3).
9. Support programs which would increase minimum seismic structural resistance standards. (Goal 3).
10. Develop programs and procedures which will inform the general public and other governmental agencies of the seismic-geologic hazards and policies which concern them. (Goal 4).
11. Continue improving the County's disaster response system. (Goal 5).
12. Request that public safety facilities be located, designed, and managed in a manner which would maximize their ability to remain functional during and after an earthquake. (Goal 5).
13. Request funds and programs to aid in the abatement of unsafe structures. (Goal 6).
14. Plan to review and amend this Element as required. (Goal 7).
15. Encourage geologic hazards research programs and acceptable risk studies. (Goal 7).
16. Support geologic protection legislation. (Goals 2, 3, 5, and 6).
17. Require consistency between this Plan, the County General Plan, and County ordinances. (Goals 2, 3, 4, 5, and 6).
18. Require all new developments to comply with established seismic safety standards. (Goals 2 and 3).
19. Encourage the reduction of risks associated with hazardous old buildings through action programs, including, but not limited to renovation, occupancy reduction, and selective demolition. (Goals 3, 6, and 7).
20. Provide relocation assistance to persons or businesses temporarily or permanently dislocated from hazardous old buildings. (Goals 6 and 7).

PLAN IMPLEMENTATION

There are three phases to the Plan Implementation program of the Seismic and Public Safety Element. Phase I are those action programs which are currently adopted with the adoption of the Element. Phase II are those action programs that are to be initiated by the Planning Department following adoption of the Element. This phase structures the Phase II programs into a series of *priorities*. Phase III are those action programs (outside the jurisdiction of this Department) which the County makes a commitment to support.

PHASE I:

Utilize the composite Seismic Hazard Management Map.

PHASE II:

Priority 1 — (Short-range actions to be initiated within two years)

(a) Continue the precautionary measure of requiring a representative from the Department of Building and Safety to be included on the Subdivision Review Committee.

(b) Adopt the policies and criteria of the Alquist-Priolo Geologic Hazards Zones Act, S.B. 520 (Public Resources Code) as it applies to the San Andreas, San Jacinto and other faults considered, and to extend the policies and criteria to all other potentially "active" faults within San Bernardino County.

(c) Require a comprehensive geologic and engineering study for structures of human occupancy, when proposed within Special Geologic Study Areas, which is to be reviewed by an Engineering Geologist as required by the Alquist-Priolo Geologic Hazards Zones Act.

(d) Where subdivisions, large-scale housing projects and critical facilities are proposed for Special Studies Zones, request that all structural and site development standards be compatible with the geologic hazard.

(e) Delineate boundaries of potentially active faults, of soils subject to landslides and volcanic activity, and of inundation paths of landslides, dam failure and lava flows, and to designate these areas as "Geologic Hazard Special Study Zones".

(f) Delineate areas subject to intensive ground shaking, subsidence and liquefaction, and designate these areas as "High Geologic Hazard Areas".

(g) Acknowledge through the planning process that suitable land uses for land unfit for structures of human occupancy are for open space and recreational uses, and other human structural development.

(h) Let geologic data on file with the County be open to the public and local government for review.

(i) Request that identifiable geologic hazards and hazard management zones be on file in appropriate County Office, on subdivision maps, parcel maps, zoning maps and on deeds.

Priority 2 — (Medium-range actions to be initiated within five years)

(a) Adopt an ordinance establishing land use setbacks from potentially active faults, consisting of:

- 50 foot setback for structures of human occupancy
- 150 foot setback for critical facilities, and
- 50 foot addition to both setbacks, if the trace is inferred.

(b) Amend building and zoning ordinances pertaining to medium- and high-rise development to provide for earthquake safety considerations including pedestrian safety, access for emergency vehicles, and evacuation assembly areas.

(c) Adopt an ordinance prohibiting structures for human occupancy and for emergency designed use astride potentially active faults, landslides and in the inundation path of an earth flow.

(d) Adopt an ordinance implementing the policies of the Alquist-Priolo Hazard Zones Act to parcels subject to landslides and volcanic activity and to parcels within the inundation path of landslides, dam failure and lava flows.

(e) Adopt an ordinance which would require critical facilities and high or involuntary occupancy structures to publicly post their calculated level of risk.

(f) Require a comprehensive geologic and engineering study for proposed County review for critical facilities, subdivisions and high or involuntary occupancy buildings, and require a dynamic analysis as a section of the comprehensive geologic and engineering study, but only for critical facilities and large projects.

(g) Request a review of access roads and utilities serving the proposed site (along with the required comprehensive geologic and engineering site study) for all future County disaster communications centers, and fire stations.

(h) Request State and Federal agencies to require consistency between the Seismic and Public Safety Element and grant applications for public and quasi-public projects located within San Bernardino County.

(i) Inform the Department of Communications and Emergency Services on the results of technical findings and/or the recommendations of this plan.

Priority 3 — (Long-range actions to be initiated within five to fifteen years)

(a) Require real estate agents to inform all prospective buyers of any and all geologic hazards which are contained in or transverse the subject property.

(b) Send earthquake safety instructions to every resident of the County explaining how to secure a home against groundshaking and what a person should do during an earthquake.

(c) Inform all property owners, whose property contains or is traversed by a geologic hazard, of the potential risk.

(d) Develop educational programs on seismic-geologic risk to be made available to all medias.

(e) Re-map all geologic hazard maps in greater detail on larger scale maps (1:24,000 scale maps).



B. FLOOD HAZARD POLICY PLAN

Flooding has long been recognized as a serious problem in San Bernardino County. Back in 1939, the San Bernardino County Flood Control District was established to effectively reduce this costly, natural hazard. The District presently exercises control over all main streams in the County; acquires rights-of-way for all main channels; constructs channels; and has carried out an active program of permanent channel improvements in coordination with the U.S. Army Corps of Engineers. However, due to the enormity of the problem; and the constantly increasing run-off caused by additional urban development, flooding remains a problem in many portions of the San Bernardino County.

Special flood hazard studies have been conducted in various portions of the County to identify areas of potential flooding. Based upon these studies, the following intermittent or ephemeral streams and rivers represent areas of potential flooding, following

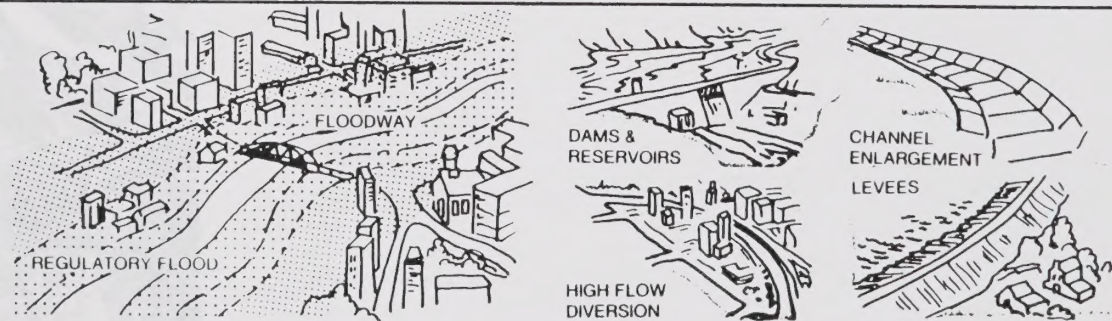
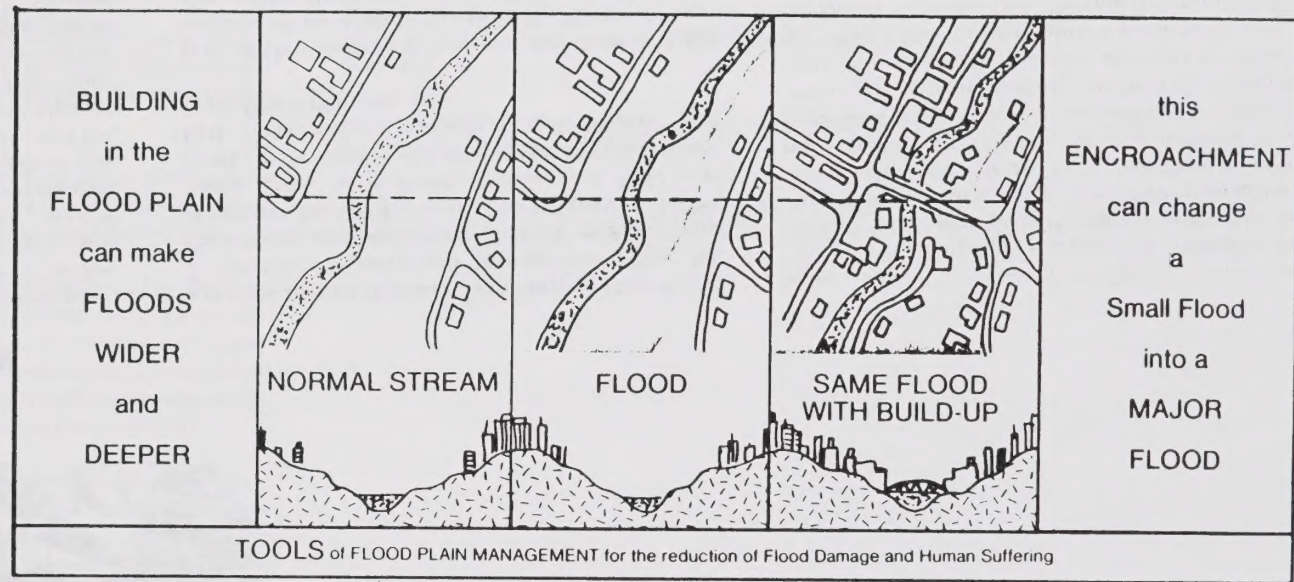
a certain amount of rainfall as shown on Maps 6 and 7, the Flood Hazard and Management Maps: the Cucamonga and Deer Creek Channels in the vicinity of Ontario, the San Timoteo Creek in Loma Linda, the Zanja Creek in Redlands, Wilson and Wildwood Creeks in the vicinity of Yucaipa, the upper reaches of Lytle Creek, and certain portions of the Mojave River in the Desert Planning Area.

It should be emphasized, however, that there are large portions of the County, particularly the Desert portion, where flood-prone areas have not been identified due to a lack of information.

There are numerous programs designed to reduce flood losses, including both structural and non-structural approaches, some directed at preventing floods, others at controlling these floods that cannot be prevented (Figure 9). The structural measures of the County Flood Control District includes flood

water storage areas such as dams, reservoirs and debris basins, and the construction of related facilities such as levees and channel improvements. The non-structural measures or the flood plain management, as it is commonly referred to, include flood plain zoning, subdivision regulations, grading ordinances, and hazardous land or channel acquisition. In urbanized areas such as many portions of the Valley Planning Area, the structural measures are most feasible; on the other hand, in unurbanized rural land, such as the Desert Planning Area, the non-structural or flood plain management approach appears to be more effective.

Figure 9 — Tools in Flood Plain Management



MEASURES TO REDUCE Vulnerability to Floods provide for a future with more freedom from flood damage, often at minor cost and little adverse effect on the environment . . .

REGULATIONS

(Zoning, Building Codes Subdivision)

- FLOOD PROOFING • RELOCATIONS • URBAN RENEWAL •

MEASURES TO MODIFY FLOODS

are often required to alleviate existing problems and sometimes to forestall future problems

OTHER MEASURES

aid the Flood Plain occupant in coping with floods

- EDUCATION • TAX ADJUSTMENTS • FLOOD INSURANCE •
- WARNING & EMERGENCY PLANS •

GENERAL GOAL

To prevent injury or loss of life and damage to property due to flooding hazards.

SPECIFIC OBJECTIVES

1. To interpret potential flood hazards within San Bernardino County.
2. To provide the regional information necessary to begin the process of developing land use plans which protect against potential flood hazards.
3. To propose procedures which will safeguard the public from structural failure associated with flood hazards.
4. To promote public awareness of potential flood dangers.
5. To provide for public safety prior, during, and after hazardous floods.
6. To promote interagency assistance for persons affected by hazardous floods.
7. To recognize and consider state-of-the-art advancements relating to flood control.



Santa Ana River, looking south from Aqua Mansa.

POLICIES:

1. Identify, delineate, and appraise the hazardous flood-prone areas within the County (goals 1, 2 and 4).
2. Continue to support and expand existing, on-going, comprehensive County, State and Federal programs initiated to reduce the hazards and effects of flooding including national flood insurance (Goals 1, 5, and 6).
3. Minimize unjustifiable costs to government units and the general public, caused by development in flood hazard areas (Goals 2, 4 and 6).
4. Develop alternative uses for flood plain areas, such as parks, greenbelts, golf courses, and wildlife refuges (Goals 2 and 7).

5. Prevent the isolation of areas which are safe from flooding, but which, due to location, could suffer problems during a disaster (Goals 2 and 5).
6. Protect adjacent upstream and downstream, private and public, landowners from direct and substantial increases in flood damages (Goals 2, 3, 5, and 7).
7. Prevent the construction of all structures of human occupancy, as well as critical facilities, within the defined flood hazard area (Goals 3 and 5).
8. Prohibit the occupancy or encroachment of any structure, improvement or development that would obstruct the flow of water in a designated floodway on the flood plain (Goal 3 and 5).
9. Develop a public education program on flood hazards particularly in areas not yet fully protected by flood control projects or zoning regulations (Goal 4).
10. Protect unwary land and homebuyers against

victimization brought about by unknowingly purchasing property in high flood hazard areas (Goals 4 and 5).

11. Provide a basis for the periodic review and revision of the flood control system to reflect changing land uses and to incorporate new technologies (Goals 4 and 7).

12. Continue and expand the County's acquisition program to augment the control of the more hazardous flood-prone portions of the County. (Goal 5).

PLAN IMPLEMENTATION

PHASE I:

(a) Utilize Flood Hazard Management maps.

PHASE II:

Priority 1 — (Short-range actions to be initiated within two years)

(a) Delineate boundaries of known flood-prone areas and indicate areas that should be considered in future studies.

(b) Guide the type and manner of flood plain use to satisfy both safety requirements and County land use needs by means of a wide range of management techniques including, but not limited to: flood plain zoning, subdivision regulations, grading ordinances, building ordinances, and abatement and acquisition programs.

(c) Continue requiring the dedication of land designated as future flood control channels under subdivision, mobile home, and land division planning processes.

(d) Continue requiring a representative from Flood Control District to be included on the Subdivision Review Committee.

Priority 2 — (Medium-range actions to be initiated within five years)

(a) Adopt and/or enforce any pertinent land use ordinances designed to prohibit the occupancy or encroachment of any structure, improvement, or development that would obstruct the flow of water in a designated floodway on the flood plain.

(b) Revise the subdivision regulations to include an additional requirement governing the acceptance of dedicated streets whereby connector and major streets shall be provided at elevations higher than that of the flood which was selected to delineate the floodways.

(c) Based upon flood hazard studies, the Board of Supervisors should continue to expand land use regulations to include, but not be limited to flood hazards.



Table 1

FIRE HAZARD SEVERITY SCALE

CRITICAL FIRE WEATHER FREQUENCY	I		II		III	
	SLOPE %		SLOPE %		SLOPE %	
FUEL LOADING	0-40	41 +	0-40	41 +	0-40	41 +
LIGHT (GRASS)						
MEDIUM (SCRUB)						
HEAVY (WOODS-BRUSHWOODS)						
MODERATE  HIGH HAZARD  EXTREME HAZARD 						

C. WILDLAND FIRE HAZARD POLICY PLAN

The primary fire hazard areas in San Bernardino County are the Chino Hills, San Gabriel and San Bernardino Mountains and their surrounding foothills, the Redlands-Badlands, and Crafton Hills. These areas are susceptible to wildland fires due to: (1) the ruggedness of the terrain, (2) the types and amounts of vegetation, and (3) climatic factors.

The three categories stated above combine to make the San Bernardino County wildlands an extreme fire hazard area. Any one factor or combination thereof is enough to constitute a classification of high or extreme hazard.

Maps were prepared depicting the hazardous fire area, the percent of slope and fuel loading, which were combined in Wildland Fire Hazard Special Studies Area Map (Map 8). This is a pictorial representation of the Fire Hazard Severity Scale (Table 1). This

table depicts the areas of moderate, high and extreme fire hazards; by fuel-light, medium and heavy; by the percent of slope — 0-40 and greater; and by the critical fire weather — Classes I, II, III. Class I being that which has an annual average of less than one day a year in the "high hazard" or "extreme hazard" category; the Class II has an annual average of 1 to 9.5 days a year, and Class III has 9.5 or more days a year. San Bernardino County falls in Class III, where *critical* fire weather occurs more than 9.5 days a year.

The hazardous fire area is protected by the United States Forest Service, the California Division of Forestry, fire protection districts, and city fire departments. The U.S. Forest Service is primarily responsible for wildland fires within the National Forest lands, while the private lands within the National Forest and the surrounding foothill wildlands are protected by the California Division of Forestry. Due to the dis-

tances involved, it is not practical for the State to provide immediate fire protection, so the State contracts with the U.S. Forest Service to fight wildland fires within the National Forest.

With the use of effective brush clearance around structures and roadways, building codes and zoning ordinances, the wildlife fire hazard problems may be reduced in occurrence and severity.

GENERAL GOAL

To reduce loss of life, injuries, damage to property and natural resources due to wildland fires.

SPECIFIC OBJECTIVES

1. To interpret the hazardous fire area within the County of San Bernardino by providing the regional information necessary to begin the process of developing land use plans which will protect against wildland fire hazards.
2. To propose procedures which will safeguard the public from structural failure associated with wildland fire hazards.
3. To promote public awareness of wildland fire hazards.
4. To provide for public safety prior, during and after wildland fires.
5. To promote inter-agency assistance for persons affected by wildland fires.
6. To recognize and consider state-of-the-art advancements in fire fighting technology and protection.

POLICIES

1. Define and limit the extent and intensity of development in areas of high fire hazard. (Goal 1).
2. Identify and prescribe "fire safe" standards for those areas which are critical and hazardous due to urban development. (Goals 2 and 4).
3. Support a program which would expand fuel breaks, fire roads and greenbelts. (Goal 2).
4. Support programs which would mitigate the brush exposure hazard to structures (Goal 2).
5. Require that all development plans be reviewed by local planning, fire, water, health, road, and flood control authorities (Goal 2).
6. Support plans which would provide for adequate and reliable water supplies for community fire protection in hazardous areas (Goal 2).
7. Support plans which would provide for safe ingress and egress of emergency equipment (Goals 2, 4 and 5).

8. Designate escape routes which will safely handle public evacuation (Goals 2, 4 and 5).
9. Establish more stringent regulations governing distances between structures in fire hazard areas (Goal 3).
10. Expand existing fire prevention programs through interagency programs, mass education or media, and the ongoing studies of hazards (Goal 6).
11. Establish a program providing for the abatement of hazardous structures (Goal 3).
12. Support for the abatement of structures of human occupancy in areas of exceptionally high fire hazard (Goals 3 and 4).
13. Support the re-evaluation and strengthening of existing mutual aid agreements, equipment, and labor policies as well as qualification requirements of regular personnel (Goal 6).



PLAN IMPLEMENTATION

PHASE I:

- (a) Utilize the Wildland Fire Hazard Management Map.

PHASE II:

Priority 1 — (Short-range action to be initiated within two years)

(a) Delineate the boundaries of the Wildland Hazardous Fire Area.

(b) Require structural fire protection practices (as recognized by fire protection agencies) be planned and provided for subdivisions as a contingency for the approval of proposed new developments in wildland areas.

(c) Require all proposed developments to be adequately served by water supplies for community fire protection; in accordance with the standards of the San Bernardino County Fire Chiefs' Association. In addition, no water supply will be considered if it would lower the underground water table.

(d) Require all proposed area development to provide for safe and ready access for fire and other emergency equipment and for routes of escape which will safely handle evacuations.

(e) Require at least two different ingress-egress routes.

(f) Require a 60-foot right-of-way for the construction of two 12-foot traffic lanes, two 8 foot parking lanes, and two 10 foot roadside strips upon which the fire hazard should be abated. Maintenance to keep roadside strips free of fire hazard should be required. (Hazard areas only).

(g) Building densities, (as determined by minimum buildable lot area and spacing between structures) to be approximately four dwellings per acre for slopes up to 15 percent, and two dwellings per acre of slopes from 15 to 30 percent. For slopes greater than 30 percent, densities shall be limited to one unit for every three to five acres, or structural development prohibited. (in all Wildland Hazardous Fire Areas).

(h) Require buildings to be spaced at least 30 feet apart (in hazard areas), in order to minimize the exposure and risk from an adjacent structural fire and the conflagration potential of the spread of fire from structure to structure.

(i) Require land developers to provide an interim fuel management program.

Priority 2 — (Medium-range action to be initiated within five years)

(a) Adopt regulations requiring the listing of fire hazard information in the deed of the fire hazard properties.

(b) Revise the subdivision and zoning ordinances to include fire safety standards.

(c) Require all requests to build within the hazardous fire area to be reviewed by the local planning commissions, and the responsible fire authority, for applicable fire regulations and approval.

(d) Strengthen County Planning laws to provide for better fire protection.

(e) Require on-site access to swimming pools for fire protection.

Priority 3 — (Long range action to be initiated within five to fifteen years)

(a) Devise and adopt a "Wildland Hazard Alert" system which would warn people of the dangers of the wildland fire hazardous area.

(b) Provide fuel break and greenbelt standards to be applied to the wildland fire hazard area.

(c) Require all roads, streets, and buildings to be visibly designated by name or number in order to facilitate fire protection.



D. DEFENSIBLE SPACE POLICY PLAN

The incidence of crime in San Bernardino County, as in many other cities and counties across the nation, has been increasing at an alarming rate over the past several years. A major effort to reduce this rate and reestablish both real and perceived security and safety, focuses on the concept of "Defensible Space". It generally involves a wide range of mechanisms: (1) Physical and psychological barriers; (2) strongly defined areas of influence; (3) promoting a sense of territoriality; (4) improved opportunities for both public and private surveillance; and (5) the strategic location of intensively used community activities, structures, or community facilities that combine work to bring environment under the control of its users or its residents (Figure 10).

Implementation of the "Defensible Space" concept may be accomplished through both the exercise of County review and regulatory functions as well as through the efforts of private developers. Subdivision regulations, as well as zoning ordinances, offer numerous opportunities for incorporation of this concept.

Another provision which can improve security and safety for individual buildings focuses upon the hardware of existing openings. Revised standards must be developed which call attention to door hardware, sliding glass doors and windows.

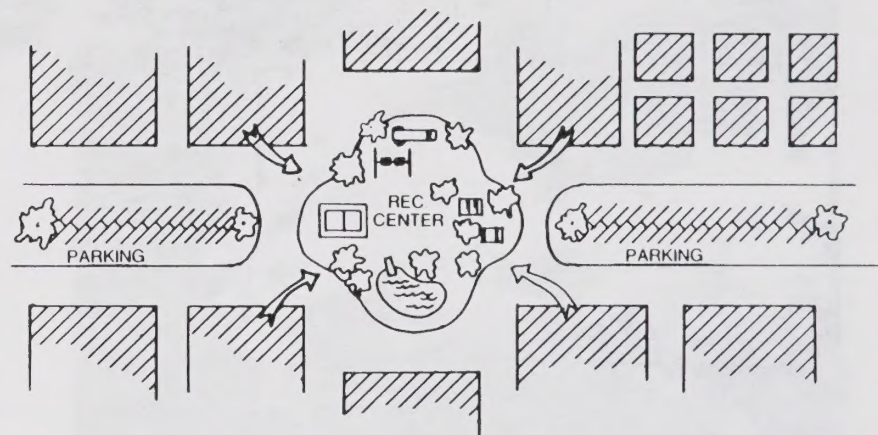
GENERAL GOAL

To reduce loss of life, injury and loss or damage to property by considering crime prevention in site planning and development design.

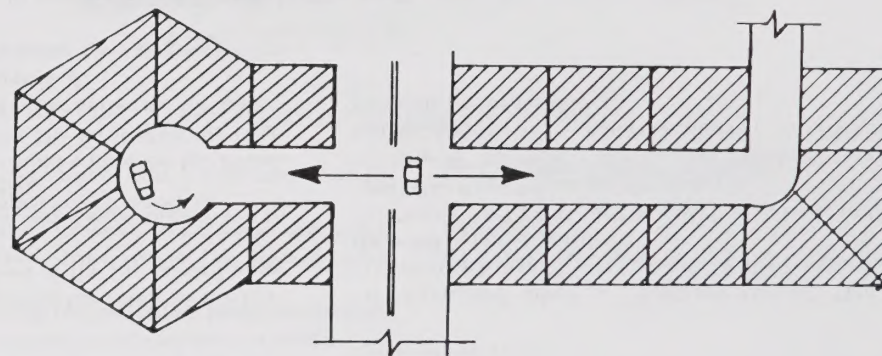
SPECIFIC OBJECTIVES

1. To reduce crime prevention techniques, methodology, and experience into the physical planning process.
2. To increase public awareness on the relationship between crime prevention and physical planning.

Figure 10 — Designing for Defensible Space



- Recreation Center and parking centrally located enhancing neighborhood & patrol observation & recognition . . .
- Well lighted at night . . .
- Walkways situated to generate enough traffic to provide a deterrent by virtue of number of people using them . . .



- Cul-de-sacs are short enhancing intra - neighborhood & patrol surveillance.
- Cul-de-sacs too long and narrow difficult patrol & neighbor observation and recognition.
- Wide for patrol to turn around.
- Difficult for patrol to turn around

POLICIES

1. Develop interagency input, coordination, and review to incorporate crime prevention techniques and methodology into the planning process (Goal 1).
2. Maximize the time required by the criminal to gain access needed to engage in criminal activity, as well as to escape from the scene, thereby appreciably increasing the difficulty and risk involved in committing the crime (Goal 1).
3. Advocate the restructuring of proposed developments to facilitate their control by the people who utilize or inhabit them (Goals 1 and 2).
4. Maximize the social deterrents to crime in street patterns and lot plans by enhancing neighborhood observation and recognition (Goals 1 and 2).
5. Encourage the clustering of houses into small neighborhoods removed from major thoroughfares, thereby enhancing neighborhood recognition and surveillance and making strangers in the neighborhood obvious (Goals 1 and 2).
6. Maximize the capability of both police patrol and the general public to visually survey their surrounding environment (Goals 1 and 2).
7. Develop programs to inform related professions and the general public of the relationships between crime prevention and physical planning (Goals 1 and 2).
8. Maximize the opportunities to either report or impede a crime in progress (Goal 1).
9. Improve the visual security image, as well as the intensity of use of streets and public spaces (Goal 1).

PHASE II:

Priority 1 — (Short-range actions to be initiated within two years)

- (a) Encourage the design of residential developments which will build a sense of "community" and implement the concept of the safe environment.

- (b) Encourage the use and type of landscaping situated in locations so as to maximize observation, while providing the desired degree of aesthetics.

- (c) Encourage the clustering of industries and businesses by operating hours, whereby industries and businesses operating after normal hours will not be isolated.

Priority 2 — (Medium-range action to be initiated within five years)

- (a) Adopt subdivision and zoning regulations requiring the incorporation of crime prevention techniques and methodology in the physical design of developments.

- (b) Adopt regulations specifying the provision of vehicle access to the front and back of all structures within an industrial park, shopping center, mall or strip commercial area.

- (c) Adopt subdivision regulations limiting the length, and provide minimum requirements for the width of cul-de-sacs, to increase patrol and intra-neighborhood surveillance and recognition.

- (d) Adopt subdivision and zoning regulations specifying sufficient off-street parking, well lighted, and situated so that it can be readily observed from patrol.

- (e) Adopt subdivision and zoning regulations requiring developments to locate their recreation or community facilities in areas which will receive a maximum amount of observation from the residents.

- (f) Adopt regulations whereby parking stalls are laid out to permit maximum observation by patrol or attendants.

- (g) Adopt subdivision regulations specifying enclosed garages rather than carports.

- (h) Encourage (through the site planning review process) the development of pedestrian amenities within public spaces and along sidewalks, thereby increasing the intensity of use, providing a deterrent to crime.

- (i) Require a representative from the Sheriff's Department to be included on the Subdivision Committee.

E. SAN BERNARDINO COUNTY'S EMERGENCY PREPAREDNESS PROGRAM

Background and Risk:

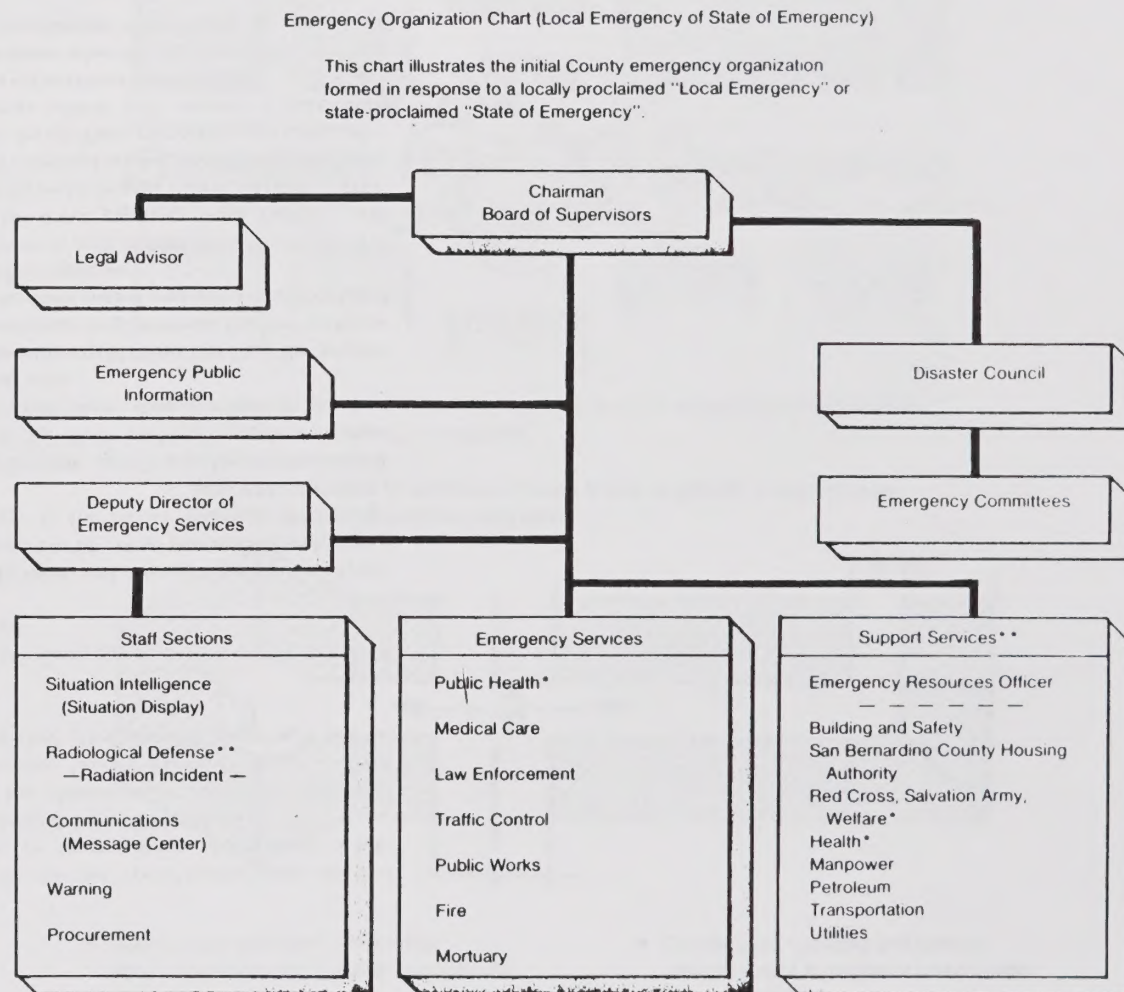
It is the responsibility of public agencies to protect the health, safety and welfare of the general public. These agencies are responsible for determining the nature and potential of natural disasters and taking appropriate action to prevent serious loss due to fire, flood, earthquake, and other geologic hazards. Also, these agencies should develop emergency preparedness operations in order to protect life and property in the event of a natural disaster.

The purpose of disaster preparedness is to safeguard people in natural emergencies. This section is not concerned with man-made disasters such as war, only those of natural causes. Disaster preparedness means that a jurisdiction is prepared to respond promptly to save a life and protect property if it is threatened by an emergency of any kind. This requires that preparedness actions have to be taken, and planning be completed before the event of any disaster. The entire concept of emergency duties must be "to do the right thing at the right time". In the case of an extreme emergency, police forces, fire forces, ambulances, hospitals, medical personnel, radio and television stations, concerned citizens and emergency units must be organized by key executive coordinators.

Specific areas of vulnerability can be delineated as an essential first step in developing preparedness plans and land use construction standards. These plans cover the fire hazard areas, flood prone zones, areas of possible earthquake and other geologic hazards. For more specific information concerning fire, flood, and seismic hazard plans, refer to each of the Policy Plans separately.

In the event of any of these emergencies, the San Bernardino Communications and Disaster Services is equipped for emergency operations.

Figure 11 — Emergency Organization Chart



Line of Authority

*County Emergency Service authorized to operate within city jurisdiction.

** Activated as and to the degree needed.

The Federal, State and County governments are becoming increasingly aware of their responsibilities to the public in rescue operations, fire fighting, utility repairs, provision of food, shelter and medical help to victims of natural disasters.

As a result of the San Fernando earthquake, the Federal, State and County governments are cooperating more effectively than ever before in emergency preparedness. The necessary team effort of public agencies was lacking after the San Fernando earthquake because of the initial lack of communications. Although responsible for fire fighting rescue operations in the unincorporated area, the Los Angeles County Fire Department was not aware of the critical situation at the Veteran's Hospital until 9:05 A.M., three hours after the disaster.

In the event of such an emergency, San Bernardino County Communications and Disaster Services is prepared to make contact with all agencies responsible for providing emergency disaster services as provided by the Unified San Bernardino County-Cities Disaster Organization. As the Emergency Operating Center for the County, the Office of Communications and Disaster Services is the central radio dispatch with consoles directly linked to local government units (County networks), law enforcement units, fire protection units, and hospitals. Amateur radio operators provide backup radio communications organized as RACES (Radio Amateur Civil Emergency Service) and REACT (Radio Emergency Assistance Coordination). Direct communications can also be established with Civil Air Patrol which has ten squadrons at Norton Air Force Base and seven squadrons at Chino Airport. Each occupational area such as engineering, utilities, and schools has a liaison man in charge of operations for his area.

The joint efforts of the police, fire, and building departments at all levels of government will be required in the control of rescue, evacuation and safeguarding of life and property. The rapid assessment of the situation immediately after a major earthquake is

particularly vital due to the dangerous condition of buildings and cultural structures, such as dams and overpasses. Dangerous areas will have to be blocked off until these structures can be checked to prevent further risk of life due to aftershocks. Fires frequently occur, requiring rapid action to clear streets of debris and to allow the passage of emergency equipment.

The Department of Communications and Disaster Services, incorporated city emergency agencies, and local police power (Sheriff's Department) also have consideration for approval of emergency plans, for evacuation routes, based upon the circumstances of the particular natural disaster.

In the Valley Planning Area of the County, the major freeway routes out of the County are Interstate 10 and 15, and Highway 91, as well as numerous major and secondary highways. For the Mountain Planning Areas, major evacuation routes are 2, 18, 30, 38, 138, 173, and Mount Baldy Road. In the Desert Planning Area, there is Interstate 15, 40, State Highways 58 and 127, U.S. 95 and 395, and Highways 18 and 62. In most cases, the San Bernardino Sheriff's Department is in charge of evacuation procedures.

As a supplement to and in accordance with the Communications and Disaster Services Emergency Plan, San Bernardino County has prepared a contingency plan. Its purpose is to provide for quick and effective response to and recovery from any future disaster and to ensure that the loss of life, injury and obstruction of property can be reduced to a minimum through adequate planning, training and the implementation of such emergency programs as are necessary. If a disaster strikes the County:

1. The Communications and Disaster Service Emergency Plan will be activated or partially activated, depending upon the intensity of the disaster and the loss of life and damage to property.
2. The County's Emergency Operating Center will be activated and become the Control Point for disaster operations.

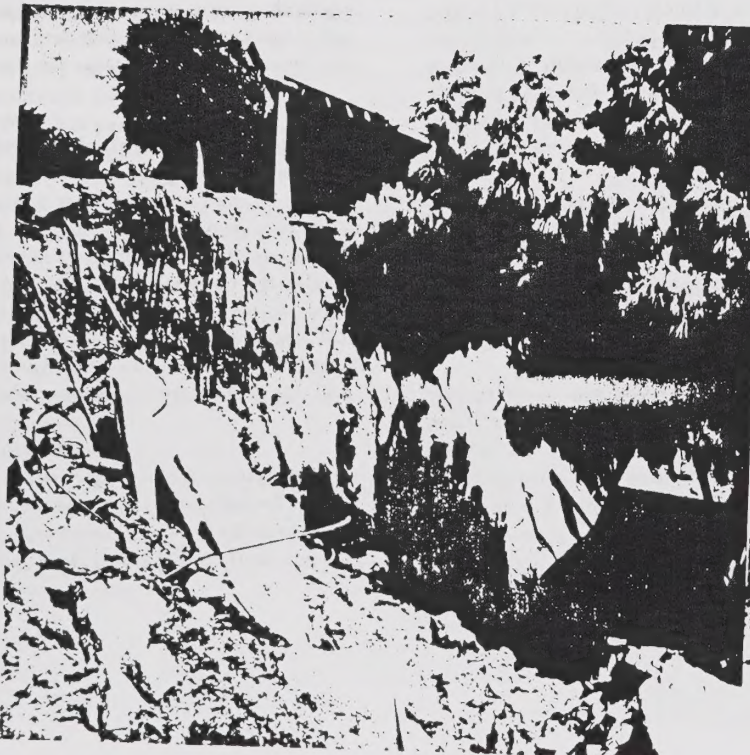
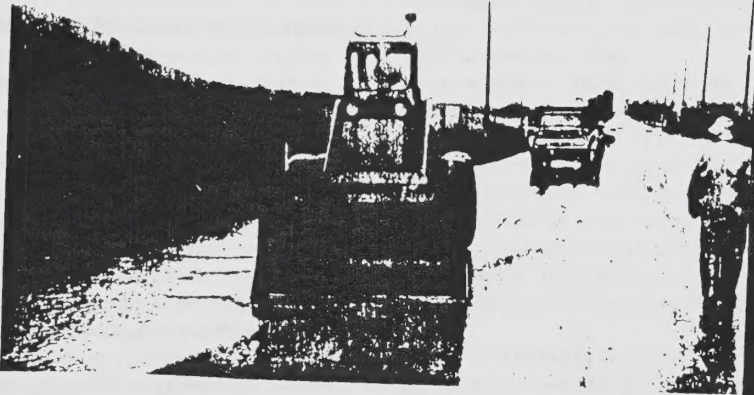
3. The administration and operation of each service is the responsibility of the Service Chiefs as defined in the Communications and Disaster Services Emergency Plan.

4. The evacuation of an area of the County and/or the destruction of an area is a command responsibility and no Service Chief shall exercise this responsibility. This, however, does not preclude the Chief of the Fire Services from exercising his responsibilities for evacuation of people or destruction of property or facilities in the immediate fire area. The ultimate responsibility for evacuation and distribution of an area as required, rests with the Director of Civil Defense and his immediate subordinates.

RECOMMENDATIONS

The Emergency Plan for San Bernardino County accommodates all aspects of emergency communications, mutual aid, manpower needs and lines of command. In updating this plan, the County should consider the following:

1. The inventory of adequate supplies and the protection thereof;
2. Frequent testing of communications equipment and standby power sources for adequacy, making sure they were all well-anchored and braced;
3. The inventory of available equipment for rescue services;
4. The protection of life and support systems;
5. Frequent maintenance of the manpower roster to staff the operating component of the Emergency Plan;
6. The continued development and testing of disaster services to evaluate the effectiveness of the plan; and
7. Protection from looting.



APPENDIXES

APPENDIXES

A A CITIZEN'S GUIDE FOR EMERGENCY ACTION

B GLOSSARY OF TERMS

C BIBLIOGRAPHY

D MAPS

A — A CITIZEN'S GUIDE FOR EMERGENCY ACTION

FIRES

Fire Officials must pre-plan for emergency operations to insure the efficient utilization of all available resources. The magnitude, complexity and frequency of disastrous fire problems has placed increasing demands on coordinated mutual aid plans and operations within the fire and rescue services. The purpose of the Fire and Rescue Emergency Plan is therefore:

- A. To provide for the mobilization, organization and operation of the fire defense facilities of the State, to minimize the effects of disasters.
- B. To provide a uniform plan of mutual aid for the most effective mobilization and dispatch of all available fire fighting resources on a local, area, regional and statewide basis.
- C. To prepare and recommend a procedure for recruiting and training auxiliary or volunteer personnel necessary to augment the regularly organized fire personnel in the event of a disaster.
- D. To provide a plan for inventory of all fire department personnel, apparatus, and equipment in California.
- E. To provide between local fire officials, State and Federal governmental facilities for receiving and disseminating information, data, and directions affecting the fire services.
- F. The Fire and Rescue Division of the California Office of Emergency Services is charged with the responsibility of coordinating and implementing this plan.

In case of a fire in your area:

- 1. Call the Fire Department;
- 2. Close the windows, blinds and drapes;
- 3. Unless otherwise directed, fill available containers with water for fighting fires;

- 4. Turn off water that is running to keep from reducing the supply, and to keep the pressure in water lines used for fighting fire;
- 5. Watch your house inside and out for a fire that might start;
- 6. If you have a swimming pool or water reservoir, be sure it is accessible for firemen to use in fire fighting;
- 7. Hook up and test portable pumps and hoses if available; and
- 8. Do not visit fire areas unless your assistance is needed; your presence might hamper rescue and other emergency operations.



FLOOD

After Warnings:

1. Drinking water should be stored in clean bathtubs, and in various containers;
2. If forced to leave your home and time permits, move essential items to safe ground; fill tanks to keep them from floating away and grease immovable machinery;
3. Move to a safe place before access is cut off by flood waters.

During Flood:

1. Do not use fresh food that has come in contact with flood waters;
2. Test drinking water for purity; wells should be pumped out and the water tested before drinking;
3. Seek necessary medical care at the nearest first aid station or hospital. Food, clothing, shelter and first aid will be available at community shelters.
4. Do not visit disaster areas unless your assistance is requested; your presence might hamper rescue and other emergency operations.
5. Do not handle live electrical equipment in wet areas; electrical equipment should be checked and dried before returning to service; and
6. Use flashlights – not lanterns or torches to examine buildings; flammables may be inside.



EARTHQUAKES

BEFORE AN EARTHQUAKE:

1. Check your home for earthquake hazards;
 - a. Bolt down or provide strong support for water heaters and other gas appliances;
 - b. place large and heavy objects on the lower shelves;
 - c. securely fasten shelves to walls; and
2. Hold occasional home emergency drills to provide your family with knowledge to avoid injury and panic during disasters.
 - a. provide for responsible members of the family to receive medical self-help instruction;
 - b. keep a flashlight and battery-powered transistor radio;
 - c. keep immunizations up to date for all family members;
 - d. conduct calm family discussions about earthquakes, fires, and other possible disasters;

DURING AN EARTHQUAKE:

1. Remain calm and try to calm and reassure others;
2. Indoors, watch for falling plaster, bricks, light fixtures and other objects — high bookcases, china cabinets, shelves and other furniture which might slide or topple.
3. Stay away from windows, mirrors and chimneys;
4. If in danger, get under a table, desk or bed, or in a strong doorway;

5. Do not run outside;

6. If in a high-rise office building, get under a desk;

7. Do not dash for exits since stairways may be broken and jammed with people.

8. If in a crowded store, do not rush for a doorway since hundreds of others will have the same idea. If you must leave the building, choose your exit with care.

9. If outside, avoid high buildings, walls, power poles and other objects which could fall.

10. Do not run through the streets.

11. If possible, move to an open area away from all hazards.

12. If in an automobile, stop in the safest place available, preferably an open area.

AFTER AN EARTHQUAKE:

1. Check for injuries in your family and neighborhood;
2. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury.

3. Check for fires or fire hazards.

4. Wear shoes in all areas near debris or broken glass;

5. Check utility lines and appliances for damage.

6. If gas leaks exist, shut off main gas valve and notify your gas company.

7. Shut off electrical power if there is damage to your house wiring.

8. Do not use matches, lighters, open flames or appliances until you are sure no gas leaks exist.

9. Do not operate electrical switches or appliances if gas leaks are suspected. This creates sparks, which can ignite gas from broken lines.

10. Do not touch downed power lines or objects touched by downed wires.

11. If water is off, emergency water may be obtained from water heaters, toilet tanks, melted ice cubes and canned vegetables.

12. Check to see that sewage lines are intact before permitting continued flushing of toilets.

13. Do not eat or drink anything from open containers near shattered glass.

14. Liquids may be strained through a clean handkerchief or cloth, if danger of glass contamination exists.

15. If power is off, check your freezer and plan meals to use up foods which will spoil quickly.

16. Use outdoor charcoal broilers for emergency cooking, in well-ventilated areas.

17. Do not use your telephone, except for genuine emergency calls.

18. Turn on your radio for damage reports and other information.

19. Check your chimney over its entire length for cracks and damage, especially in the attic and at the roof line.

20. Check closets and storage shelf areas. Open closets and cupboard doors carefully and watch for objects falling from shelves.

21. Do not go sightseeing, particularly in beach and waterfront areas where seismic sea waves could strike.

22. Keep the streets clear for passage of emergency vehicles.

23. Be prepared for additional earthquake shocks, called "aftershocks". Although most of these are smaller than the main shock, some may be large enough to cause additional damage.

24. Cooperate fully with your local community emergency operations officials.

Other geologic hazards such as landsliding, erosion and volcanic hazards should be protected by emergency preparedness plans of San Bernardino County by referring back to Hazards Section Map.



B — GLOSSARY OF TERMS

Alluvium — A general term for the sediments laid down in river beds, flood plains, lakes, fans at the foot of the mountain slopes, and estuaries during relatively recent geologic times.

Cinder Cone — A cone-shaped hill formed by the accumulation of volcanic cinders around a vent.

Critical Fire Weather — Such weather occurs only during a few days of each fire season and is broadly characterized by a period of prolonged drought, low moisture content in wildland vegetation, high wind velocity, and/or instability in low level atmosphere.

Defensible Space — Concept to bring an environment under the control of its residents and users through a combination of a broad range of mechanisms such as real and symbolic barriers, strongly defined areas of influence, and improved opportunities for both public and patrol surveillance.

Earthquake — Perceptible trembling to violent shaking of the ground, produced by sudden displacement of rocks below and at the earth's surface.

Emergency Preparedness — The pre-planning of food, shelter, clothing and evacuation routes for people in the event of a natural disaster.

Erosion — A group of processes whereby earth or rock material is loosened or dissolved and removed from any part of the earth's surface.

Fault — An earth fracture or zone of fracture along which the rocks on one side have been displaced in relation to those of the other.

Fault Zone — A fault, instead of being a single clean fracture, may be a zone hundreds or thousands of feet wide; the fault zone consists of numerous interlacing small faults or a confused zone of gouge, breccia or other material.

Fault Ground Rupture — Ground break along the fault line during an earthquake.

Flood Inundation — Rising and overflowing of a body of water onto normally dry land.

Ground Failure — A situation in which the ground does not hold together, such as in landsliding, mud flows, liquefaction and the like.

High Hazardous Fire Areas — Those wildland areas where the combination of vegetation, topography, weather and population creates most difficult fire problems.

Hydrocompaction — Settling and hardening of land due to application of large amounts of water for irrigation.

Landslides — The downward and outward movement of slope forming earth materials under the influence of gravity.

Liquefaction — A process by which a water saturated sand loses coherence when shaken. Involved is the collapse of sand grains into intergranular voids which induces an increase in pore pressure and loss of strength. This loss of strength leads to a quicksand condition in which objects can either sink or float depending on their density.

Magnitude — The rating of a given earthquake is defined as the logarithm of the maximum amplitude on a seismogram written by an instrument of specified standard type at a distance of 62 miles from the epicenter. It is a measure of energy released in an earthquake. The zero of the scale is fixed arbitrarily to fit the smallest recorded earthquakes. The scale is open ended but the largest known earthquake magnitudes are near 8½. Because the scale is logarithmic, every upward step of one magnitude unit means a 32 fold increase in energy release. Thus, a Magnitude 7 earthquake releases 32 times as much energy as a Magnitude 6 earthquake. Magnitude is *not* the same as intensity.

Seiche — An earthquake-generated wave within enclosed or restricted bodies of water (e.g., lakes and reservoirs).

Seismic — Pertaining to an earthquake or earth vibration, including those that are artificially induced.

Subsidence — A shrinking of a large area of land, usually observed as a shrinkage.

Uniform Building Code — A set of proposed construction regulations and standards which a city or county may adopt by ordinance.

Wildfire — An uncontrolled fire burning in wildland vegetation, structures and other improvements.

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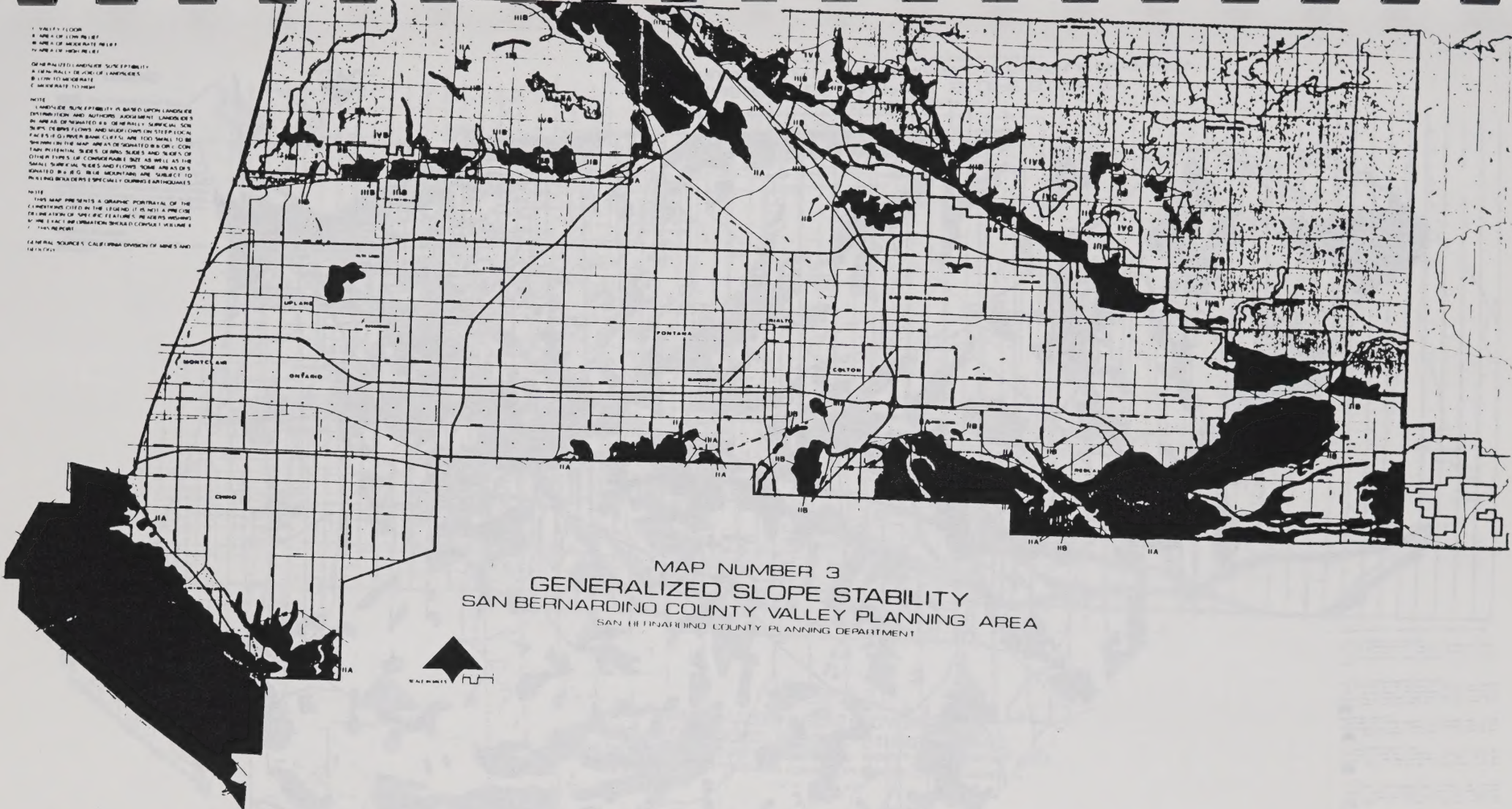
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D - MAPS

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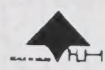


LEGEND

- STATE ROUTE
- COUNTY ROUTE
- LOCAL ROAD
- BOUNDARY
- AREA OF SLOPE INSTABILITY
- AREA OF SLOPE INSTABILITY
- AREA OF SLOPE INSTABILITY
- AREA OF SLOPE INSTABILITY

NOTE: THIS MAP WAS PREPARED BY THE SAN BERNARDINO COUNTY PLANNING AND DEVELOPMENT DEPARTMENT. IT IS A GENERALIZED MAP AND DOES NOT REPRESENT A SURVEY. IT IS NOT TO BE USED FOR ENGINEERING PURPOSES.

MAP NUMBER 4
 GENERALIZED MAP OF SLOPE STABILITY
 SAN BERNARDINO COUNTY MOUNTAIN AND DESERT PLANNING AREA
 DATE OF PREPARATION: 1984

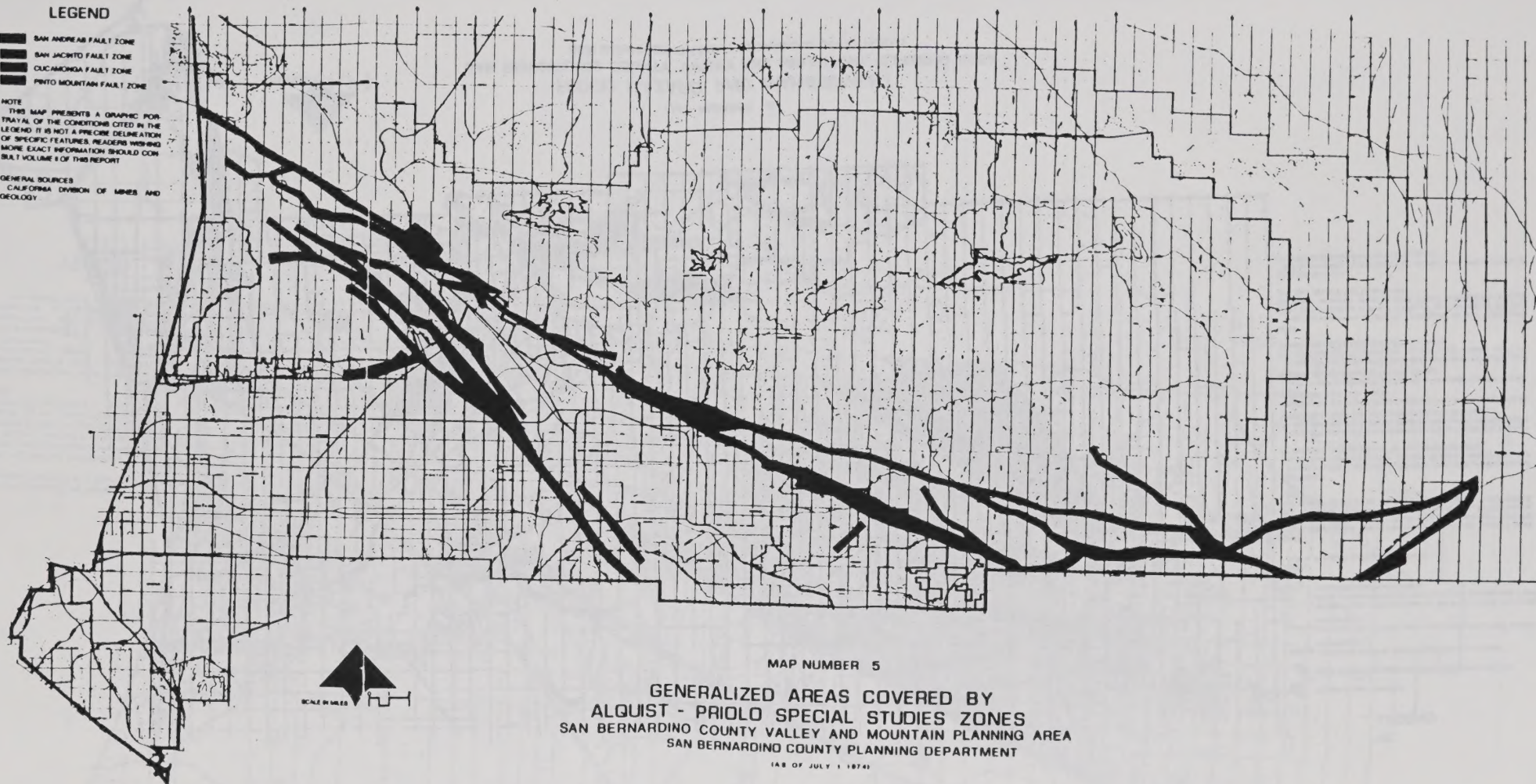


LEGEND

-  SAN ANDREAS FAULT ZONE
-  SAN JACINTO FAULT ZONE
-  CUCAMONGA FAULT ZONE
-  PINTO MOUNTAIN FAULT ZONE

NOTE
THIS MAP PRESENTS A GRAPHIC POR-
TRAYAL OF THE CONDITIONS CITED IN THE
LEGEND. IT IS NOT A PRECISE DELINEATION
OF SPECIFIC FEATURES. READERS WISHING
MORE EXACT INFORMATION SHOULD CON-
SULT VOLUME I OF THIS REPORT.

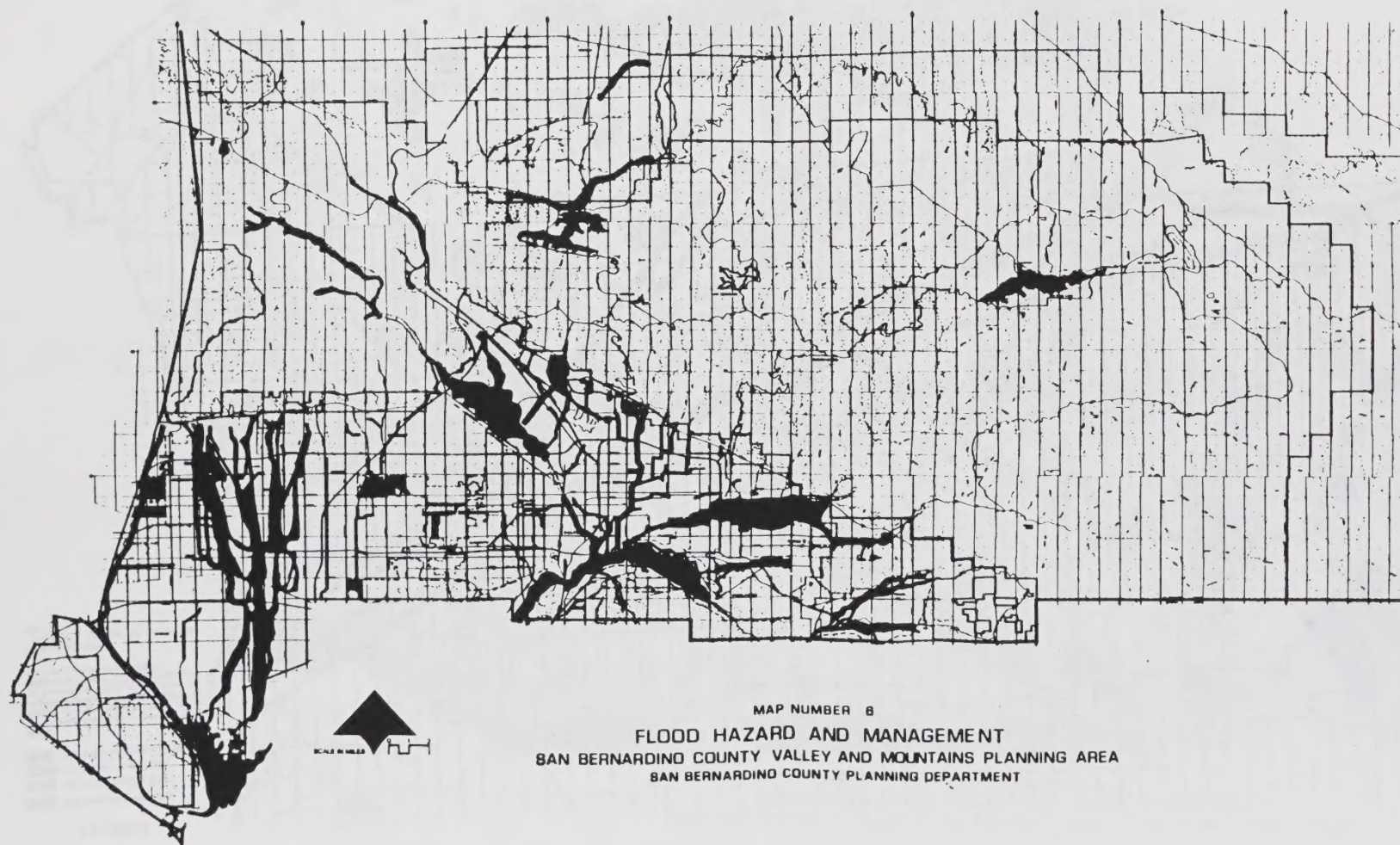
GENERAL SOURCES
CALIFORNIA DIVISION OF MINES AND
GEOLOGY



MAP NUMBER 5

GENERALIZED AREAS COVERED BY
ALQUIST - PRIOLO SPECIAL STUDIES ZONES
SAN BERNARDINO COUNTY VALLEY AND MOUNTAIN PLANNING AREA
SAN BERNARDINO COUNTY PLANNING DEPARTMENT

(AS OF JULY 1, 1974)



LEGEND

- FLOOD PLAIN ZONING (1)
- AREA SUBJECT TO INUNDATION BY 100 YEAR FLOOD (2)
- CONCRETE CHANNEL INDICATING POTENTIAL FLOOD HAZARDS (3)
- CHANNEL OR STORM DRAIN INDICATING POTENTIAL FLOOD HAZARDS (4)
- INTERMITTENT STREAM DRAINAGE AREA EXCLUSIVE OF FLOOD PLAIN MANAGEMENT AND OR PROTECTIVE WORKS INDICATING POTENTIAL FLOOD HAZARDS (4)
- FLOOD HAZARD STUDY AREA (5)

NOTE:
EXCLUDING THOSE AREAS WHERE FLOOD HAZARD STUDIES HAVE BEEN CONDUCTED AND OR FLOOD PLAIN ZONING HAS BEEN ENACTED THE REMAINING BALANCE OF THE MOUNTAIN AND VALLEY PORTION OF THE COUNTY IS YET TO BE STUDIED TO DETERMINE ALL FLOOD PRONE AREAS

FOOTNOTES:
(1) AREA WHERE FLOOD HAZARD STUDIES HAVE BEEN COMPLETED AND FLOOD PLAIN ZONING ENACTED. COUNTY DESIGNATIONS OF PP-1 AND PP-2 AND CITY DESIGNATION OF "C" HAVE BEEN COMBINED

(2) EXCEPTING ARE THE CUCAMONGUA CHANNEL IN ONTARIO THE CITY OF FONTANA AND PORTIONS OF UPLAND LOMA LINDA AND REDLANDS WHICH ARE SUBJECT TO INUNDATION BY A 100 YEAR FLOOD

(3) BUILT BY U.S. ARMY CORPS OF ENGINEERS SURPASSING SPECIFICATIONS OF A 100 YEAR FLOOD

(4) ADJACENT PROPERTIES SUSCEPTIBLE TO FLOOD HAZARD BOUNDARIES TO BE DETERMINED BY FUTURE STUDIES

(5) AREA WHERE FLOOD HAZARD STUDIES HAVE BEEN CONDUCTED BY U.S. ARMY CORPS OF ENGINEERS U.S. GEOLOGICAL SURVEY DEPT. OF WATER RESOURCES OR PRIVATE CONSULTANTS

NOTE:
THIS MAP PRESENTS A GRAPHIC PORTRAIT OF THE CONDITIONS CITED IN THE LEGEND IT IS NOT A PRECISE DELINEATION OF SPECIFIC FEATURES. READERS WISHING MORE EXACT INFORMATION SHOULD CONSULT VOLUME 8 OF THIS REPORT

GENERAL SOURCES:
SAN BERNARDINO FLOOD CONTROL DISTRICT U.S. ARMY CORPS OF ENGINEERS WATERSHED PLANNING AGENCIES

MAP NUMBER 8

FLOOD HAZARD AND MANAGEMENT SAN BERNARDINO COUNTY VALLEY AND MOUNTAINS PLANNING AREA SAN BERNARDINO COUNTY PLANNING DEPARTMENT

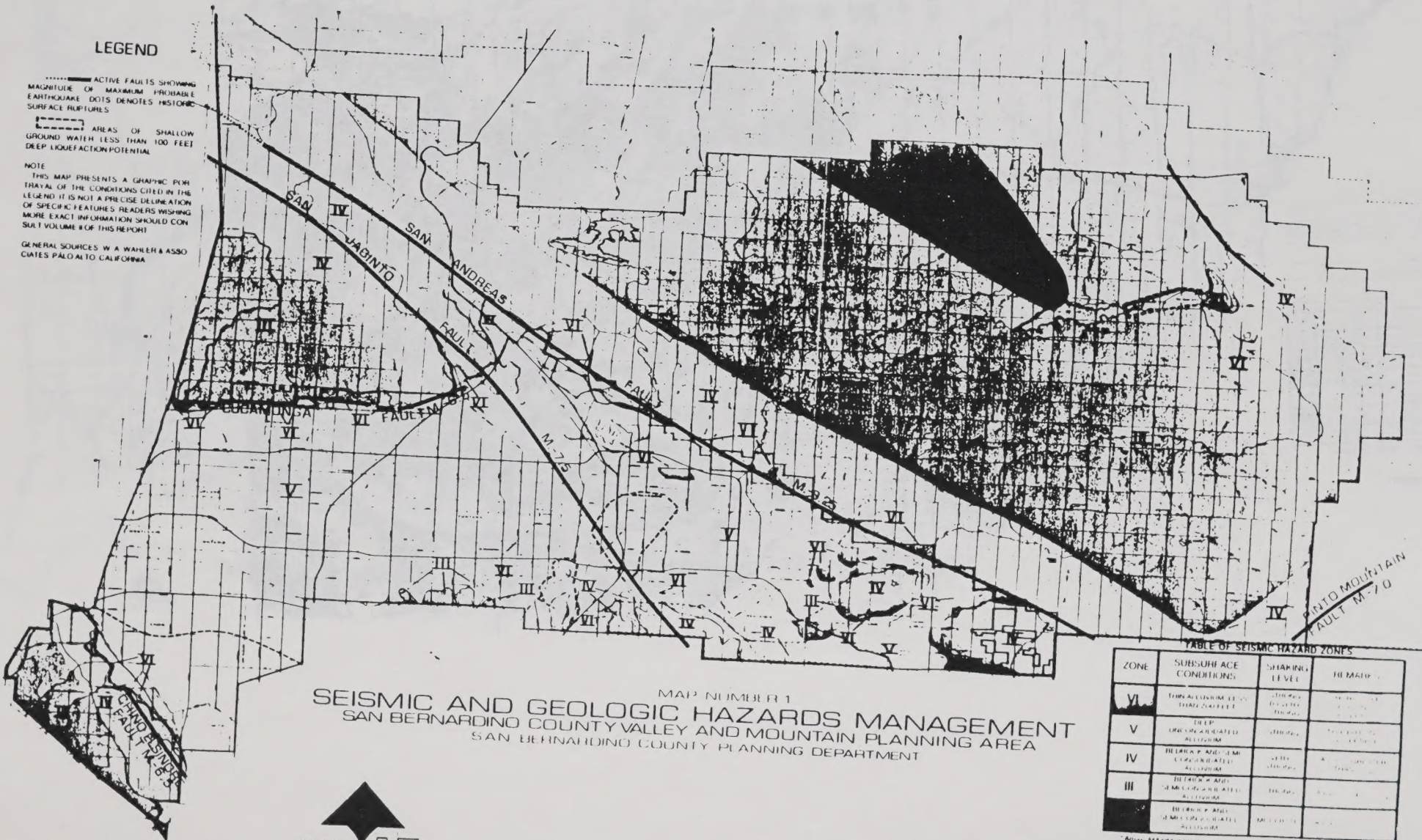
LEGEND

..... ACTIVE FAULTS SHOWING
MAGNITUDE OF MAXIMUM PROBABLE
EARTHQUAKE. DOTS DENOTES HISTORIC
SURFACE RUPTURES

----- AREAS OF SHALLOW
GROUND WATER (LESS THAN 100 FEET)
DEEP LIQUEFACTION POTENTIAL

NOTE
THIS MAP PRESENTS A GRAPHIC POR-
TRAYAL OF THE CONDITIONS CITED IN THE
LEGEND. IT IS NOT A PRECISE DELINEATION
OF SPECIFIC FEATURES. READERS WISHING
MORE EXACT INFORMATION SHOULD CON-
SULT VOLUME II OF THIS REPORT.

GENERAL SOURCES: W. A. WAHLER & ASSO-
CIATES, PALO ALTO, CALIFORNIA



SEISMIC AND GEOLOGIC HAZARDS MANAGEMENT SAN BERNARDINO COUNTY VALLEY AND MOUNTAIN PLANNING AREA SAN BERNARDINO COUNTY PLANNING DEPARTMENT

TABLE OF SEISMIC HAZARD ZONES

ZONE	SUBSURFACE CONDITIONS	SHAKING LEVEL	REMARKS
VI	TERMINAL CLAYEY THICK 200 FEET	SHAKING LEVEL 1	SHAKING LEVEL 1
V	DEEP UNCONSOLIDATED ALLUVIUM	SHAKING LEVEL 2	SHAKING LEVEL 2
IV	BELTIN P. AND SEMI- CONSOLIDATED ALLUVIUM	SHAKING LEVEL 3	SHAKING LEVEL 3
III	BELTIN P. AND SEMICONSOLIDATED ALLUVIUM	SHAKING LEVEL 4	SHAKING LEVEL 4
	BELTIN P. AND SEMICONSOLIDATED ALLUVIUM	SHAKING LEVEL 5	SHAKING LEVEL 5

* Actual Maximum Earthquake Shaking Level



LEGEND

TABLE OF SEISMIC HAZARD ZONE

Zone	Seismic Hazard Zone	Seismicity Level	Seismicity Example
III B	Very Low Seismicity	Very Low	Very Low
II B	Low Seismicity	Low	Low
I A	Medium Seismicity	Medium	Medium
I B	High Seismicity	High	High

NOTES:
 1. THE SEISMIC HAZARD ZONE IS BASED ON THE SEISMICITY LEVEL OF THE AREA.
 2. THE SEISMIC HAZARD ZONE IS BASED ON THE SEISMICITY LEVEL OF THE AREA.
 3. THE SEISMIC HAZARD ZONE IS BASED ON THE SEISMICITY LEVEL OF THE AREA.
 4. THE SEISMIC HAZARD ZONE IS BASED ON THE SEISMICITY LEVEL OF THE AREA.

MAP NUMBER 2
 SEISMIC AND GEOLOGIC HAZARD MANAGEMENT
 SAN BERNARDINO COUNTY DESERT PLANNING AREA
 DATA: INTERNATIONAL GEOPHYSICAL CENTER, PLANNING, ESTIMATING

-  DAM
-  FLOOD CONTROL PROJECT (CHANNEL AND/OR LEVEE)
-  MAJOR FLOOD CONTROL PROJECT (CHANNEL AND/OR LEVEE)
-  FLOOD PLAIN ZONING
-  FLOOD PRONE AREA

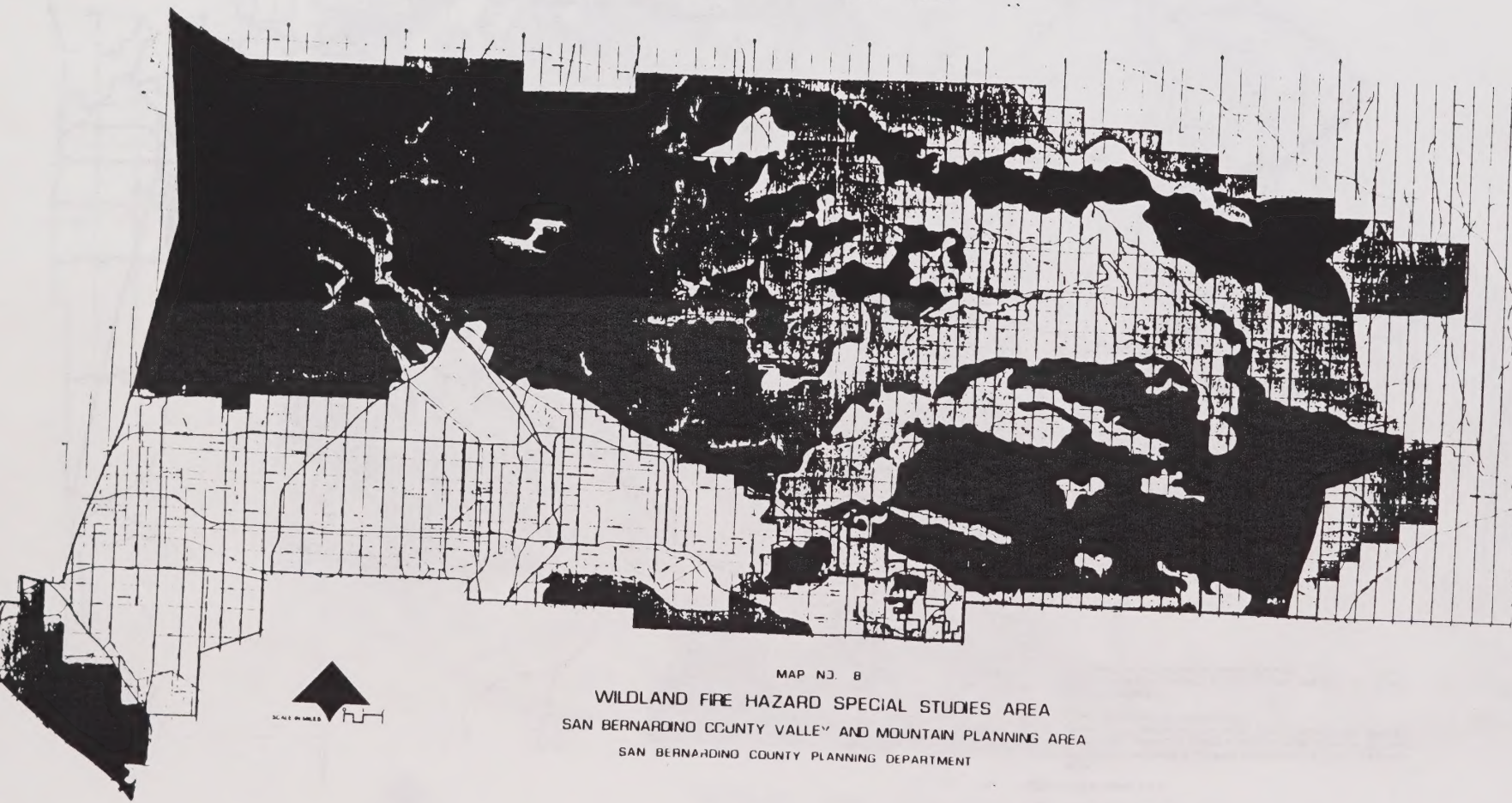
NOTE
THIS MAP PRESENTS A GRAPHIC PORTRAYAL OF THE CONDITIONS
CITED IN THE LEGEND. IT IS NOT A PRECISE DELINEATION OF SPECIFIC
FEATURES. READERS WISHING MORE EXACT INFORMATION SHOULD
CONSULT VOLUME II OF THIS REPORT

GENERAL SOURCES
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT, U.S. CORPS
OF ENGINEERS, WATERSHED PLANNING AGENCIES



FLOOD HAZARD, MANAGEMENT, FLOOD PROTECTION AND DRAINAGE FEATURES SAN BERNARDINO COUNTY DESERT PLANNING AREA

SAN BERNARDINO COUNTY PLANNING DEPARTMENT



LEGEND

- 1. EXTREME FIRE HAZARD
- 2. HIGH FIRE HAZARD
- 3. MODERATE FIRE HAZARD
- 4. LOW FIRE HAZARD
- 5. UNCLASSIFIED
- 6. UNDEVELOPED LAND
- 7. DEVELOPED LAND
- 8. WATER
- 9. ROAD
- 10. RAILROAD
- 11. AIRPORT
- 12. POWER LINE
- 13. TELEPHONE LINE
- 14. FENCE
- 15. CANYON
- 16. MOUNTAIN
- 17. PLATEAU
- 18. HILLS
- 19. VALLEY
- 20. PLAIN
- 21. DESERT
- 22. MOUNTAIN
- 23. PLATEAU
- 24. HILLS
- 25. VALLEY
- 26. PLAIN
- 27. DESERT
- 28. MOUNTAIN
- 29. PLATEAU
- 30. HILLS
- 31. VALLEY
- 32. PLAIN
- 33. DESERT
- 34. MOUNTAIN
- 35. PLATEAU
- 36. HILLS
- 37. VALLEY
- 38. PLAIN
- 39. DESERT
- 40. MOUNTAIN
- 41. PLATEAU
- 42. HILLS
- 43. VALLEY
- 44. PLAIN
- 45. DESERT
- 46. MOUNTAIN
- 47. PLATEAU
- 48. HILLS
- 49. VALLEY
- 50. PLAIN
- 51. DESERT
- 52. MOUNTAIN
- 53. PLATEAU
- 54. HILLS
- 55. VALLEY
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- 57. DESERT
- 58. MOUNTAIN
- 59. PLATEAU
- 60. HILLS
- 61. VALLEY
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- 63. DESERT
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- 69. DESERT
- 70. MOUNTAIN
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- 75. DESERT
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- 79. VALLEY
- 80. PLAIN
- 81. DESERT
- 82. MOUNTAIN
- 83. PLATEAU
- 84. HILLS
- 85. VALLEY
- 86. PLAIN
- 87. DESERT
- 88. MOUNTAIN
- 89. PLATEAU
- 90. HILLS
- 91. VALLEY
- 92. PLAIN
- 93. DESERT
- 94. MOUNTAIN
- 95. PLATEAU
- 96. HILLS
- 97. VALLEY
- 98. PLAIN
- 99. DESERT
- 100. MOUNTAIN

MAP NO. 8
 WILDLAND FIRE HAZARD SPECIAL STUDIES AREA
 SAN BERNARDINO COUNTY VALLEY AND MOUNTAIN PLANNING AREA
 SAN BERNARDINO COUNTY PLANNING DEPARTMENT

U.C. BERKELEY LIBRARIES



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